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Worthington Duplex Pumping Engine at Newark, N. J.

WE give herewith a fine perspective view of the new pumping engine designed and constructed for the Newark water-works, by H. R. WORTHINGTON, of this city. A recent visit to the works, and a careful inspection of the engine, togegether with the study of the official record of its performances, enables us to speak with considerable positiveness, concerning the merits of a design and a principle which are attracting no little attention among hydraulic engineers, and seem likely to inaugurate important changes in the patterns of water-work machinery.

Water being an incompressible fluid, the problem of maintaining a steady pressure in pumping and forcing large quantities of it, is one of considerable difficulty. Notwithstanding the relief afforded by the compressible fluid, air, confined in the air-chamber, which is an inseparable feature of force-pumps, the action of an ordinary engine consists in a series of blows, as it were, delivered upon the column of water. By making the pump-piston double-acting, that is, alternately sucking and forcing on either side, a continuous pressure is approximated; but this depends directly upon the piston speed, and the speed of a piston is uniform only in direct-acting engines, using full pressure of steam throughout the stroke. The employment of a fly-wheel to overcome the dead-points, creates an unequal and constantly-varying speed of piston, and a momentum which, considering the incompressible nature of the water, is not a little dangerous. But expansion and condensation, which is not atempted in direct-acting steam-pumps, are imperatively demanded, for reasons of economy in the construction of large pumping engines for water-works. There is also a difficulty, not easily overcome, in securing a prompt valve-action, by some means other than that of an eccentric upon the crank-shaft. This common expedient requires the conversion of the reciprocating motion of the steam-piston into a rotary motion, not consistent with a uniform piston speed, and not available or necessary, (for any other purpose than the valve movement,) in the case of a machine which is intended to pump water, and do that only.

We may, then, state the problem to be solved as follows: Required, an engine which shall fulfill these conditions:

I. It must expand and condense the steam, so as to achieve a high duty.

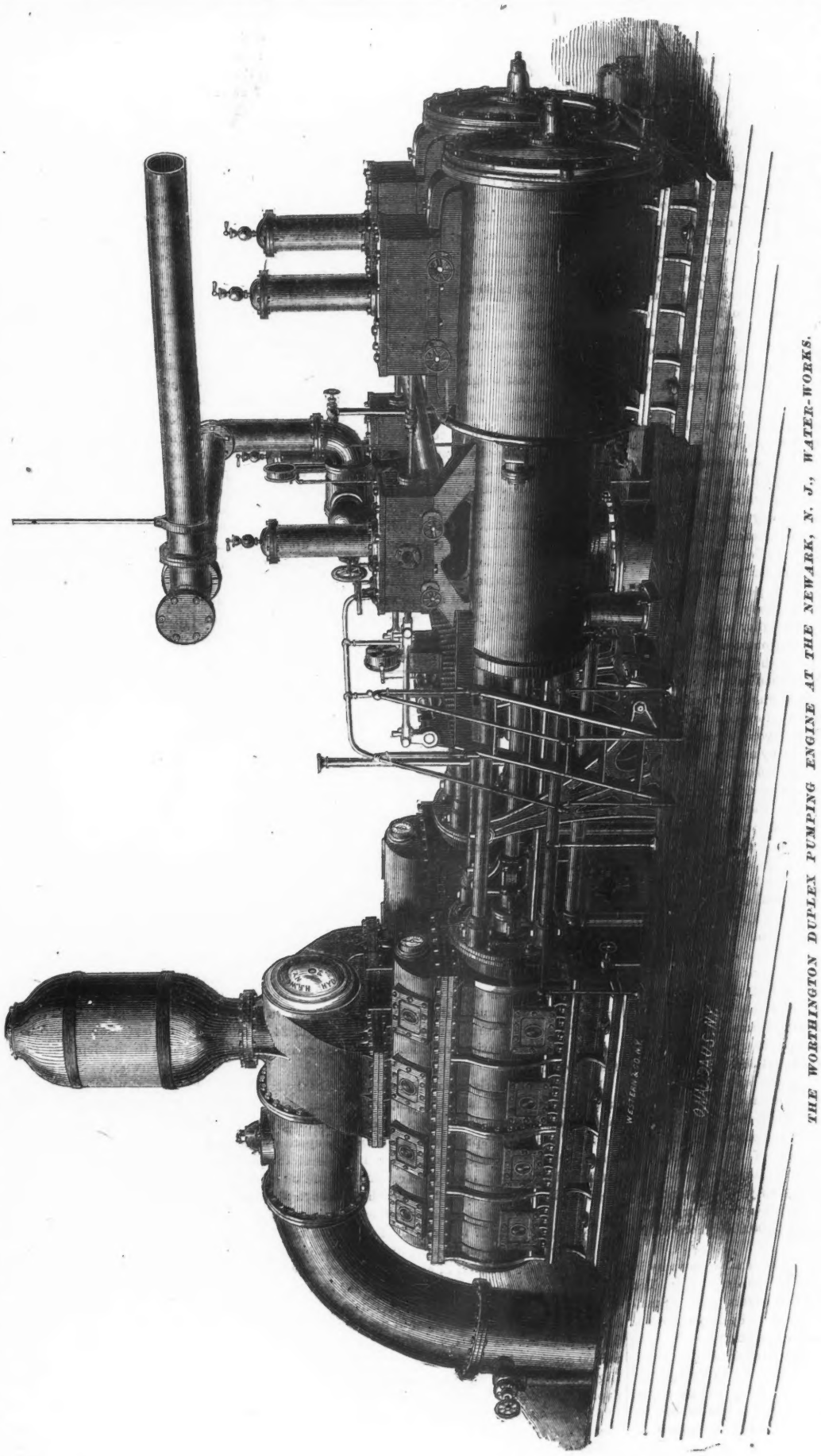
II. It must employ the reciprocating motion of the steam-piston directly to pump water.

III. It must maintain a constant pressure in pumping, without momentum.

IV. It must, therefore, have a unform piston speed.

V. It must secure a perfectly certain steam-valve movement, without the use of an eccentric.

VI. With these apparently contradictory requirements, it must combine compactness, cheapness, durability, accessibility for repairs, etc., and be able to compete in these respects with the best pumping engines.



THE WORTHINGTON DUPLEX PUMPING ENGINE AT THE NEWARK, N. J., WATER-WORKS.

Let us now inquire how these severe conditions are met by the principle of the Worthington duplex engine. It is evident at once that the expansion of the steam in the ordinary manner, by means of a cut-off, is out of the question, since we are to have a uniform piston speed, and are forbidden to off-set, by an acquired momentum, the diminishing pressure of the steam in the cylinder. This result is, therefore, only to be secured by the employment of the principle long ago embodied in the Woolf engine, which consisted of two cylinders, one for high-pressure and the other for low-pressure steam, and the second receiving upon an increased piston area the steam discharged from the first. This idea, long comparatively disused, has recently been revived for marine purposes, and the "compound engines" of this class have achieved already a high reputation.

In the engine now under consideration, it will be seen that the two cylinders are placed in line, the smaller, or high-pressure cylinder, being before the other, and the same piston-rod passing through both. The mean pressure resulting from the action of the two cylinders being constant, or nearly so, when the parts are properly proportioned, the result is a uniform piston speed.

The reciprocating movement of the steam piston is utilized in the simplest possible manner, by prolonging the steam pison-rod into a pump cylinder. This is the earliest form of the application of steam to pumping, or, indeed, to any purpose; and WATT'S invention of the crank-motion is, like the use of the walking-beam, however useful for other applications of power, a departure from true economy where the final motion required is a reciprocating one. The pump piston operates constantly against the full head of water in the stand-pipe, or between the engine and the reservoir, and the machine is nearly without momentum. Shutting off steam would stop it almost instantly, and shutting off the exit of the water would subject it to the full pressure of the boiler, without further damage than a possible leakage at the joints.

But here we must consider the question of the valve motion. This it would apparently be difficult to secure satisfactorily without connections which our conditions preclude. The movement of the slide valves by an arm and tappet connection from the main piston-rod, such as is seen in the Earle and in the Worthington high-pressure pumps of the old pattern, is perhaps the best device that has been presented for machines without rotary motion, permitting the use of eccentrics. But it is open to certain objections, which we will not pause to examine. Among others, that of a slight loss in efficiency at the moment of the

moving of the slide valve. No such objection, nor, indeed, so far as we can discover, any other objection of any kind, lies against the ingenious contrivance from which the "Duplex" takes its name. This is simply the placing of two steam engines, of equal dimensions, side by side, running them at the same speed, and causing the one to operate the steam valves of the other. Nothing could be more beautiful in simplicity and certainty of operation than this arrangement.

The illustration shows clearly the general relative disposition of the important parts of the engine, namely, the high-pressure steam cylinder, which exhausts into the larger expanding cylinder immediately behind, and in line with it; the cradle-rods connecting the series of steam cylinders with the water ends in one direct line, thus bringing the power applied and the resistance encountered within the machine itself, which works self-contained, without heavy foundations or bracing, a simple brick foundation, merely to receive the weight of the engine, being all that is required.

The single-acting air-pumps are driven by rock-shafts off the main piston-rod, and are in a convenient and accessible position below the open cradle-rods. The steam slide-valves are carefully and simply balanced. The steam cylinder and cylinder-heads are steam-jacketed, and thoroughly and elaborately lagged, though this is not shown in the engraving. The double-acting water-plungers are hollow cylinders, with tight heads, their weight being thus nearly floated; and the water, entering the numerous suction-valves below them, passes them in a nearly direct line into and through the force-valves above. The valves are rubber disks, backed by iron, working vertically on fixed spindles. They are readily reached through the hand holes, and are purposely made numerous in order to subdivide any trouble from the possible failure of any one of them. The engine being horizontal, all the cylinders and other parts are most accessible for inspection and repairs, and great solidity and steadiness are insured to the whole machine. Each engine drives its plunger at a speed uniform throughout its stroke, during which it opens, by a rock-shaft and appropriate connections, the steam-valve of its neighbor, and is obliged to pause at the end of its own stroke, till its own steam-valve, being opened by the motion of the other's piston-rod, enables it to reciprocate.

The combined and reciprocal action of the two double-acting plungers thus driven at unvarying piston speed by the combined pressures in the high and low pressure steam-cylinders, (whose sum is a practically uniform quantity,) can not but force the water in a steady, quiet stream, while the silent seating of the water-valves by their own gravity through the equalization of pressures in the water-cylinder, during the pause of each engine at the end of its stroke, completes the conditions necessary to produce a noiseless and efficient machine.

The motion of the steam-valves being perfectly positive, no fly-wheel or weighted plunger are necessary, introducing, as they invariably must, not merely the liability to injury inseparable from momentum acting on an incompressible fluid, but also a constantly varying piston speed, the effects of which no air-chamber or complication of pumps can fully neutralize.

These peculiarities of principle and structure produce a machine which once started by the mere admission of steam, is so nearly automatic in its action that, beyond occasional lubrication, nothing is necessary but a tolerably uniform boiler pressure. A fine opportunity for a comparison of this style of pumping machinery with the best class of Cornish engines is afforded by the fact that the Jersey City Water-works are situated very near those of Newark, and that the former contain Cornish engines. A new Cornish engine is now erecting at the Jersey City works, and a new Duplex is in construction for the Newark people, from which we may infer that both parties are satisfied with their bargains. From a published report of the Board of Water Commissioners of Jersey City, we leaan, by taking the whole of one year's operations, that the average capacity for twenty-four hours of each of their engines is 5,225,500 gallons of water raised to the reservoir. The head of water at the Newark works is about 175 feet, and the reservoir is a little higher, we think, than that of Jersey City. For purposes of comparison, however, we may assume this condition to be the same in both cases. The capacity trial of the Newark Duplex engine shows it to deliver 5,034,309 gallons to the reservoir in twenty-four hours, at a piston speed of 90.9 feet per minute. At a speed of 110 feet per minute, the pumps will deliver 6,092,123 gallons in the reservoir in twenty-four hours, and, making the proper deductions for stoppages, etc., in actual practice, we may assume the capacities of the two engines, (that is, the Duplex No. 1, on one hand, and the average of the two Cornish engines at the Jersey City Water-works, on the other,) to be practically equal. In other words, for a situation requiring a maximum capacity of 5,000,000 gallons either would be adequate.

A further aspect of comparison is that of relative economy in the consumption of fuel, as shown by the duty trial. Too much importance should not be attached to this point. Small differences in theoretical efficiency, as shown by duty achieved, may be due to ingenious methods of calculating the duty, or they may be offset by differences in the original cost of engines. We cannot enter into this branch of the subject at length, and shall content ourselves with saying that the report of the duty trial of the Newark engine lies before us, and we are satisfied that, by the use of certain expedients quite common in such cases, its apparent result might have been considerably increased; but notwithstanding this fact, the Newark engine is shown to have achieved the highest duty on record in this country. As for the enormous figures reported from some of the Cornish engines abroad, our American engineers have not been able, with the same class of engines, to equal them, and they are strongly suspected to smell of "ciphering." Here are the figures officially given for six different engines, expressed in pounds of water raised one foot high with one hundred pounds of coal:

Brooklyn, No. 1, Double-acting Beam	60,140,700
Belleville, (Jersey City,) Cornish	62,823,300
Hartford, (3 Experiments,) Crank	58,779,300 to 64,669,400
Brooklyn, No. 3, Double-Acting Beam	72,000,000
Cambridge, (2 Experiments,) Worthington Double Cylinder, not Duplex	66,941,100 to 67,574,600
Spring Garden, (Philadelphia,) Cornish	58,905,360

The duty trial of the Newark engine, as certified by Mr. G. H. BAILEY, formerly superintendent of the Jersey City water-works, and hence selected by the purchasers to test the new engine, shows the following remarkable results:

The duty of the engine, as obtained by multiplying together the area of the plunger in square inches, (373.85) and the pressure in pounds per square inch, (75.68) to obtain the load in pounds, and this by the travel of the piston in feet per hour, (10,908.4) and dividing this product by the number of hundreds of pounds of coal consumed per hour, (4) was 77,157,840 foot-pounds. As obtained by multiplying the displacement per stroke in cubic feet, (10.4042) into the number of strokes per hour, (2722) the weight in pounds of a cubic foot of water, (62.5) and the height in feet to which the water was raised for delivery, (174.82) and dividing this product by the number of hundreds of pounds of coal consumed per hour, (4) the duty was 77,358,478. As reduced to the actual delivery of water in the reservoir, it was 76,386,262 and 76,584,894 by the two methods respectively. Comment upon these figures is scarcely required. It only remains to consider the question of cost and ease of operation, since, if an engine which can perform this splendid duty is reasonably free from objection in these respects, it must be almost beyond rivalry.

A simple inspection of the buildings is enough to show the great difference of cost in favor of the duplex engine. The steam-piston alone of the new Cornish engine will weigh 17 tons. The whole weight of the duplex shown in our illustration is but 55 to 60 tons, and the largest piston weighs only 1400 pounds. The ponderous character of the Cornish engine, the vibrations and thumps of its huge walking-beam, the massive wall of masonry, reaching up into the second story, required to support it, and the cyclopean foundations necessary to bear the vast weight of the machinery, are familiar enough to our readers. The contrast presented is almost ludicrous when one walks into the engine-room of the Newark works and sees a machine not more than 30 feet long, 9½ feet high, (not including the air-chamber) and 10 feet broad, quietly and easily doing a work nearly or quite equal to that of its giant neighbor, and resting on common brick piers, such as one might put under the engine of a saw-mill. In many cases, where foundations, etc., and difficult are costly of construction, an engine like this could be made, set up, and started, one would think, for the money that would be required to erect a Cornish engine after it arrived on the ground.

The power is supplied by two tubular boilers, each of which has a length of eighteen feet, a diameter of five feet six inches, seventy-two tubes of three and a half inches, 1367 square feet of heating surface, and thirty-three feet of grate surface.

Survey of the Nicaragua Route for a Ship Canal.

By Col. O. W. CHILDS, C. E.

[Continuation.]

BRITO HARBOR.

A HARBOR connecting the canal with the Pacific at Brito is to be formed by the construction of a jettie or breakwater, by excavations to extend from within the moles of the jettie at 17 feet depth of water at low tide, to the foot of the lower lock, and by the construction of a wharf along its north-westerly side, surrounded by a wall of stone masonry.

From the lower lock, the base of the hill bounding the valley on the westerly and northerly sides, lies nearly parallel with and from 4 to 600 feet from the cut below described for the artificial harbor. The hill has an elevation of from 2 to 300 feet, and extends, in a westerly direction, 50 chains, to the water-line of the coast at high tide. From this point, with the coast extending off upon a line nearly at right angles to the left, the hill continues with a slight curve, also, to the left, and with nearly a vertical face over 200 feet high, 24 chains, to a short spur projecting from its base, and terminating in 30 feet depth of water.

1.45 miles southerly from this point is the rocky termination in the sea of a spur from the hill, which bounds the opposite side of the valley. The indented coast fronting the valley between these two spurs is a sand beach, upon which, at a point 4 chains southerly from the south side of the projected artificial harbor, the jettie is to commence and be extended at right angles with the line of the beach 450 feet to the coast line of low-tide; thence in a more northerly direction 600 feet to its termination, in 17 feet depth of water, at the entrance of the harbor. The opposite wing of the jettie is to commence at the rock base of the hill, at a point within the spur before mentioned, and be extended southerly 217 feet, and terminate in 17 feet depth of water at low-tide, leaving an entrance to the harbor between the termination of the jetties 400 feet in width. The area of the sea surface enclosed by the jetties at low-tide is 9.60 acres, at high-tide 20.80 acres, of which, owing to the slight inclination of the bottom, only a small portion has the depth at low-tide required for the harbor. From the water-line of the coast at high-tide to the location of the outer portion of the jettie, a distance of 1000 feet, the bottom descends 26 feet; at a further distance of about 400 feet the water has a depth of about 90 feet.

From the foot of the lock the artificial harbor, as projected, is to continue in a southerly direction 2¾ chains, with a bottom width of 200 feet; it is to extend thence in a westerly direction 17.00 chains, with a width of bottom of 440 feet, thence 13.60 chains, it is 320 feet in width; from this point to its termination at the entrance of the breakwater, its average width is 450 feet; thus giving an aggregate area within the moles of 35.80 acres, with 17 feet depth of water at low-tide. The excavations embrace within their limits a portion of the present channel of the creek, which has an average width of about 150 feet.

An area of from 200 to 300 acres, with some portions of its surface below, and others from one to two feet above high-tide, lies immediately adjoining the southerly side of a portion of the above line of contemplated harbor, from which, with an average excavation of 27 feet in depth, any additional harbor room may be formed that may at any subsequent period prove to be necessary. Efforts to sink shafts to the depth required for the harbor were made at several points that were supposed would furnish a fair indication of the material of which the whole flat is composed, but owing to the influx of sand, and in the absence of the means of tubing, these perforations could only be extended to depths ranging from 18 to 24 feet from the surface, except in a single instance, in which, with great efforts, the auger was forced through the sand to a depth of 33 feet, or about 6 feet below the bottom as planned for the harbor. From the formation and general appearance of this valley, and the indications from the borings, it is deemed reasonable to assume that the material of which the flat is composed, to a depth beyond that required for the harbor, is sand.

If, from an interruption of the navigation, or any other cause, there should be an accumulation of vessels at this point beyond the capacity of the harbor as projected, a safe anchorage for any additional number that might require it would be available in the harbors of Nacascola and San Juan del Sur, lying respectively about 10 and 11 miles south from Brito.

The canal being designed for navigation by vessels of so large a class, it is not supposed that very extensive harbor room at the ports of San Juan del Norte and Brito will be required.

The through business will probably be mainly done by seagoing vessels, constructed with especial reference to the navigation of the canal, and by others then in use, of the same and of less dimensions. The commerce of the State may be accommodated in the interior at various points on the canal, and upon the lake, also on the Pacific at the natural harbors of Fonseca, Realejo, etc., as well as that at other ports on the Pacific and on the Atlantic, by vessels that navigate the canal. The transhipment, therefore, of any very large amount of freight, or a very extensive commerce at either terminus of the canal, is not anticipated; should this prove otherwise, the enlargement of the harbors is regarded as practicable to any desirable extent, or that subsequent developments may show to be necessary.

Proceeding from 17 feet depth of water in the lake, opposite the river Lajas, in the direction of the outlet at Fort San Carlos, a distance of 59.69 miles, to a point half a mile southerly from the Boccas Islands, the depth increases to 20 feet in the first quarter of a mile, to 60 feet opposite the south end of the island of Ometepe, it is 39 feet opposite the north side of the Solentinane Islands, and from thence gradually diminishes to 14 feet at the termination of the above distance, 5.50 miles from the head of the river at San Carlos. The first 5 miles of this latter distance has quite a uniform depth, averaging, as indicated by soundings with the lead line, about 10½ feet; thence it increases to 19 feet in the channel opposite the river Frio, a sluggish stream coming in from the south opposite San Carlos, having about 150 feet width and 10 feet depth, with a uniform flow during the dry season.

From the Boccas Islands to within half a mile of the outlet the bottom of the lake is composed of fine clay. Although there is very little agitation to the surface of this part of the lake, there being no effective current, this substance to a great extent is held in suspension by the water, and may be sensibly felt with a light rod at a depth of from 10 to 11 feet. A sufficient number of soundings were taken upon lines extending from the Boccas Islands to near the head of the river, and transversely, to show that a channel of no greater average depth than 9 feet exists in this part of the lake during its lowest stages. Maintaining the lake at its ordinary high-water level would increase it to 14 feet, leaving 3 feet to be added to the depth of the channel by under-water excavation or otherwise.

The channel is to be protected by a row of piles driven on each side along its whole extent, and being connected with the shores of the river, would, by concentrating the flow, at least create a sufficient current to prevent subsequent deposits of earth, and probably, by its action on the bottom, would increase the depth, and perhaps to the extent required for canal; the expense, however, of excavating a channel 150 feet wide, and to the depth required between the rows of piles, is included in the estimate.

A line of level was commenced at the surface of Low Lake, at San Carlos, and carried down the river, on the northerly side, to the harbor of San Juan. The distances and bearings of the line, as run, were accurately taken, and the depths of the river were ascertained by soundings taken at chain distances in all cases where excavations in the bed of the stream were found to be necessary, and the location of the channel and length and position of the cuts through the bars were determined with care, by sounding and by instrumental observations from the shore. The general direction of the river is easterly; its least width is 300, and its average about 600 feet.

The whole distance from the outlet of the lake, at San Carlos, to 17 feet depth of water in the harbor of San Juan, is 119.31 miles, and the whole fall from the surface of high lake, or the elevation at which it is to be permanently maintained, to the surface of the highest tide observed in the harbor, is 107.41 feet, and to the lowest tide observed 108.73 feet.

Of the above distance the first 90.80 miles, or from San

Carlos to 0.55 miles below the Serapequi river, the San Juan is to be made navigable by excavations in its bed and by the construction of dams, to be passed by means of locks and short canals; the remaining 28.51 miles of the canal is to be constructed inland or independent of the river. Of the whole fall 62.50 feet occurs on that portion to be improved by dams, on which there is located 8 locks; the remaining 46.23 feet occurs on the inland portion of the canal, on which there are located 6 locks.

From the lake to the head of the Rapids del Toro, a distance of 27.23 miles, the surface of the river during its minimum flow has a descent of 2.24 feet. The difference between its elevation at the time it was surveyed and that during ordinary high-water, as ascertained from well defined marks repeatedly observed on the trunks of trees standing at the margin of the stream, is 5.20 feet. The slight descent in the river and the near proximity of these marks to the lake, also render them an unerring indication of the ordinary elevation of the surface of the lake during a large portion of the wet season.

The most extensive cut required on this distance is through the bar first occurring below the lake. The channel, with a depth of 19 feet opposite San Carlos, passes from a little south of the centre of the river obliquely to the north shore, with a depth gradually diminishing to 12 feet in a distance of 1.06 miles, and to 6 feet on the north side of an island 1.50 miles from the lake. The bar extends from the head of the island along up the stream, occupying the central portion of the river, which here has more than the usual width, and proceeding up, gradually increases from three to eight feet depth of water, which continues obliquely up the river to the south shore. The water, in passing over this bar from the north, accumulates with a slightly increased velocity on the south side, thus forming a channel extending from above the lower termination of that on the north side, far down the river. In this, as in all similar cases of two channels having sufficient depth and lapping each other, the cut, designed to form a navigable connection between them, is planned upon a line nearly in the direction of the current. Although this considerably increases its length beyond what would otherwise be required, it improves the direction, and is deemed necessary to avoid obstruction to the navigation by subsequent deposits.

In many instances of a change of channel to opposide sides, the depths throughout are found quite sufficient, while in other cases of straight, though of broad rivers, the depths are insufficient and under-water excavation will be necessary. The estimate provides for a bottom width of 150 feet at all of the cuts through bars in the river.

The following statement shows the number and lengths of the bars between the lake and the foot of the Rapids del Toro, the extreme depth of the cut through each, and their distances severally from the lake.

No. of Bar.	Length of each Bar in miles.	Extreme depth of cutting in feet.	Distance from Lake in miles to upper end of bar.	
1	0 650	4.00	1.048	
2	0.187	2.50	2.207	
3	0.175	1.00	5.781	
4	0.287	3.20	6 517	
5	0.325	4 60	8.313	
6	0.337	4.00	9.647	
7	1.112	3.50	13.233	
8	0 762	2 50	14.*30	
9	0.762	2.60	17.325	
10	0.662	2.20	20.431	
11	0.525	2.50	25 309	Through Toro
12	1.887	4.50	26.76	Rapids.

The depths in the channel between the bars range from 12 to 30 feet.

The Rapids del Toro occupy a broad section of the river, extending easterly upon nearly a direct line 1.82 miles. Its surface has a fall in this distance of 6.67 feet. The channel passes from 9 feet depth of water on the north side, immediately above the head of the rapids, along near the north shore, maintaining a depth varying from 6 to 10 feet, a distance of 60 chains; it here changes to the southerly side of the river, which descends more rapidly, with a depth not exceeding 2½ to 3 feet; it then passes in the direction of the centre of the river, with a depth increasing to 8 feet at the foot of the rapids; the line as located for the cut, which will be mostly in rock, lies intermediate the centre and north shore, and nearly parallel with the latter.

At the foot of the rapids, the stream is divided by an island the larger portion passing in a southly direction down the deeper channel on the west side; the bed of this branch rises from 8 feet depth at the foot of the rapids to 6½ feet, in three chains, and continues from 6½ to 7½ feet in depth nearly to the foot of the island, a distance of 27 chains; from this point to the head of Castillo rapids, a distance of 7.40 miles, the river has a uniform width, and a depth varying from 12 to 25 feet, approaching nearer the latter, the largest proportion of the distance; the descent on the river between these rapids in time of low-water is 2.36 feet.

The river at the head of Castillo rapids is 750 feet in width; it has an easterly direction 12½ chains, with a descent of 4.24 feet to the foot of the principal fall, where it abruptly bends to the south. It continues this southerly direction 16 chains, with a further fall of 1.66 feet to the foot of the rapids, where it has a width of 825 feet, and is 22.7 feet below the surface of the high lake. It here curves to the east, and, with a small branch passing on the north-westerly side of an island, a projecting point of table land is formed in the bend of the river on the north side.

The line as located occupies the channel 6 feet in depth on the north side of a small island, at the head of the rapids, and continues along near the north shore 24 chains, in 3 feet depth of water, to near the lower end of the principal fall, where it leaves the river, and is carried across the point 17.72 chains, over a surface of favorable elevation, and by 2 locks, of 8 feet lift each, it again enters the river opposite the lower end of the small island before mentioned, 0.51 miles from the head of the rapids. The surface of the river, at the point of entrance, is 22.39 feet below the high lake.

Eight chains above the lower end of the rapids, a dam, designed to elevate the water 21.66 feet, is located on rock across the river, in an average of 3.81 feet depth of water, and an extreme depth, one chain in width, of 12 feet; the dam is to have a length of 1.5 feet, of which 700 feet will occupy the present channel of the river, and 350 feet is to be extended in a trench cut down to the rock, inland, on the southerly side to the base of the hill. A guard embankment will be necessary to extend from the north abutment of the dam 4.50 chains to the upper lock, and from the north side of said lock 5.50 chains to the hill. The dam is designed to elevate the surface of the river, at the head of Castello rapids, 16.21 feet, at the foot of the Rapids del Toro, 13.91 feet, at the head of the latter rapids, 7.24 feet at the Lake of Nicaragua, 5.00 feet above the lowest stages to which the surface at these places severally subsided at the close of the dry season of 1851.

The surface of the river at the point of entrance below the second lock being 22.39 feet below the contemplated surface in the pond of the dam, and the lockage in crossing the point of land being 16 feet, the river at the foot of the lock will require to be raised 6.39 feet by the succeeding dam No. 2. The least depth of water upon the line below the point of entering the river, is 4½ feet; the greatest depth of cutting will be 6.11 feet; the cut will be extended down nearly in the direction of the centre of the river, to a point 2¾ miles below, where it terminates in 8 20 feet depth of water.

From the above connection of the line with the river to the head of the Mico rapids, a distance of 5.17 miles, the surface, by a uniform descent, falls 4.32 feet; thence, in a distance of 2.7 miles, to the location of the dam, at the foot of Balas rapids, the surface descends 7.3 feet.

The transverse section of the stream upon the line to be occupied by the dam, has an average depth of 5.95 feet, and an extreme depth of 10 feet; the dam is located nearly at right angles with the river, on a foundation of rock, and terminates on the south side against a precipitous hill, also composed chiefly of rock. Upon the north side, a flat, elevated 7 feet above the water, extends from the river 7 chains to the base of the hill. The dam is to have a length of 567 feet, and is to elevate the surface of the river at this point 17.74 feet, at the head of the rapids, 10.71 feet, and, as before stated, 6.39 feet at the foot of the lower, or lock No. 2, at Castillo. The canal has a length of 13.39 chains, and, by a cut, is to be carried through the flat with an easy curve, around the north end of the dam, and, by a lock of 8 feet lift, it connects with the river below. The cut in the bed of the river below this lock has a length of 0.62 miles, and an extreme depth of 1 foot.

The river below the dam becomes broad, and, pursuing an easterly direction, the water, with a comparatively thin volume, passes over a rock bed with a velocity greater (except at the rapids,) than is usually found in other parts of the river, and with a fall of 4.94 feet in a distance of 2.48 miles, to opposite the foot of an island.

At the junction of the canal with the river, immediately below the dam, the river has a depth of 6¼ feet, and proceeding down in the channel near the north shore, it increases to 8 and 10 feet, which latter depth, with little exceptions, continues to the foot of the island. The channel continues thence, on the north side of the river, 18 chains, where the river bends to the north, and extends in this direction, with from 15 to 20 feet depth of water, in a narrow channel along the left shore, and with a broad and shallow river on the right, to the head of the Machuca river, a distance from the foot of the island of 65 miles, and with a fall of 71 feet, or a fall of 5.65 in a distance of 3 13 miles from the foot of the lock at dam No. 2.

At the head of the rapids the river curves to the east, and in a distance of 48 chains measured on the northerly side, it has a descent of four feet; it continues this easterly direction 26 chains, to where it again, by a short curve, takes a northerly direction 21 chains, with a fall in this distance of 3.21 feet to the foot of the rapids, making an aggregate distance from the head to the foot of the rapids of 1.19 miles, and a fall of 7.21 feet.

Near the head of the rapids dam No. 3, 1.056 feet in length is located across the river in an average of 6.34 feet, and at one point in 16 feet depth of water; on the south side it abuts against a precipitous rocky hill, and on the north it terminates in a recess to be cut into the vertical face of the bank bounding a flat elevated 8 feet above the surface of the water. By this dam it is designed to raise the water 15.39 feet at the head of the rapids, and 9.74 feet at the foot of dam No. 2; and the canal as located is to leave the river opposite the island above mentioned, or 52 chains above the dam, and be carried along the base of the hills over a generally uniform and quite level surface across the two points formed by the bends of the river, and by two locks, Nos. 4 and 5, the former of 6.50, and the latter of 8 feet lift, again enters the river at the foot of the rapids in the distance from the point of divergence opposite the island of 1.68 miles: deducting from the sum, of the fall at the dam, and the descent from the head to the foot of the rapids, together, 22.60 feet, the descent by the two locks 14.50, and it leaves 8.10 feet as the height to which the surface of the river at the foot of lock No. 5 is to be raised by a succeeding dam to be located across the river below. The depth of water in the river at the entrance of the line below lock No. 5 is 2.90 feet; a cut, therefore, of 6 feet in extreme depth in earth and rock will be required to extend upon a line forming a favorable connection with that inland down the river 25 chains to its termination in 8.90 feet depth of water.

From the foot of Machuca rapids to the confluence of the San Carlos, a distance of 16.47 miles, the surface of the river has a descent of 2.8 feet.

From the junction of the two rivers to the location of dam No. 4, a distance of 3.50 miles, the surface has a descent of 4.82 feet. The channel of this section is broad, and ranges from 9 to 14 feet in depth. The whole distance from the foot of the Machuca rapids to dam No. 4 is 19.97, and the fall is 6.91 feet.

The dam is located nearly at right angles with the river in an average depth of 10.73 feet, and an extreme of 13 feet depth of water, on a light gravel consisting of the debris of a soft volcanic rock brought down by the San Carlos, and deposited over a large portion of the bed of the San Juan, from the junction of the two rivers to the Atlantic. The material is of a light yellowish color, and presents in appearance a striking contrast with that more weighty and dark-colored, constituting the gravelly portions of the bed of the San Juan above, and with the more firm and compact material of which the earth portions of the bed of the San Juan below the junction are composed. Its general depth is not known, although variable, it is probably not deep, as boulders were discovered above its surface at various places in the bed of the stream.

The dam is to be 841 feet in length, and be placed in a trench to be excavated across the river to a depth equal to that in the channel; it is to raise the water 15.1 feet at its location, 10.8 feet at the confluence of the San Carlos, 8.10 at the foot of lock No. 5, and 10¾ inches at the foot of dam No. 3, at the head of Machuca rapids. It is to terminate at its south end at the base of a hill, and on the north side a flat, elevated 14 feet above the water, intervenes between the river and a hill, affording favorable grounds on which to construct the canal 11 chains in length around the north end of the dam.

A lock of 8 feet lift is located in the cut, which reduces the surface of the canal to within 7.1 feet of the surface of the river below the dam.

The succeeding 22.40 miles are to be made navigable by three dams, Nos. 5, 6 and 7, to be constructed across the river severally at distances of 7.54, 8.60 and 6.26 miles from dam No. 4, and from each other, and by canals at Nos. 5 and 6 severally, of 11.27 and 18.65 chains in length, in each of which is to be placed a lock of 8 feet lift. The bed of the river at the site of the dams is to be lowered in the same manner as at No. 4. The present average depth of water at the sites is severally 9.50, 15,84 and 16.25 feet; the extreme depth is 13½, 28 and 22 feet. The water is to be elevated 14.45, 15,75 and 13 59 feet, severally, at the sites of Nos. 5, 6 and 7, and below Nos. 4, 5 and 6, 7.1, 6.45 and 7.75 feet, leaving a fall at these latter dams of 8 feet each, and at No. 7 of 13.59 feet.

The lengths of dams Nos. 5, 6 and 7 are severally 726, 627 and 891 feet, and the country on either side of the river at the sites, is in all respects similar to that described at the location of No. 4, except that the hill on the south side at No. 5 is 7 chains from the river, with an intervening flat 12 feet above the water, and at No. 7 the hill is 1 chain from the river. No excavation in the bed of the river between these dams will be required. These dams are large, and in construction will be difficult and expensive.

In the following statement of the elevation of the surface of the river, etc., by the dams, no allowance is made for inclination:

STATEMENT IN TABULAR FORM OF THE LOCATION, DISTANCES, ELEVATIONS. ETC., OF DAMS NOS. 1 TO 7 INCLUSIVE.

Number.	Location of Dams.	Distance from Dam to Dam in miles.	Distance from Lake in miles.	Length in Feet.	Elevation of water. Minimum flow in feet. Above Dam.	Below Dam.	Foot of Lock.	Fall at Dams in Feet.	Quantity of flow in cubic feet. High Water.	Low Water.	Thickness of volume on Dam in feet. High Water.	Low Water.	Inclination in feet per mile—High Water.	Mean velocity in miles per hour —High Water.
1	Castillo...		37.12	1050	21.66	5.76	6 39	16.00	20,497	abov 11,9 00	Toro 2.67	R'ds. 1.94	0.121	1.10
2	Los Balas.	7.46	44.58	561	17.74	8.74	9.74	8.07	21,49	11,930	4.15	2.95	.079	1 07
3	Machuca	3.13	47.71	1056	15.39	0.89	8 10	14.56	0,497	11,940	4.7	1.97	0 042	0. 6
4		21.00	68 91	841	15.01	7.01	7.01	8.0	2,381	15,19	4.58	2 80	.054	0.78
5		7.54	76.25	7.6	14 4	6.45	6.45	8.00	38,189	5,192	4.94	.92	.150	1.45
6		8.60	84.85	627	15.75	7.75	7.75	8 00	41,566	16,6 6	5.88	3.45	.161	1.60
7		6.26	91.11	891	13.59			13.5	5,530	22,212	5.67	3..8	085	1.22

Twenty-four chains above dam No. 7, the canal, as above stated, is taken from the river, and with the exception of three spurs which approach the river, requiring in passing them an extreme depth of cutting severally of 38, 47½ and 42½ feet, the line occupies highly favorable grounds, having an average elevation of about 9 feet above the surface of the river a distance 7.53 miles to the divergence of the Juanillo branch of the river; here the valley of the San Juan assumes a much greater width, and the Juanillo, with a width of one chain, and a depth at ordinary high water of 5 feet, passes from the main river, and, with many meanderings, flows in a general direction north-westerly a distance of about 23 miles, where, with a width of 4 chains, and a depth of 9 feet, it again unites with the San Juan 2.31 miles above the harbor. The canal, in crossing the head of this branch, will cut off the flow from the river; the line thence passes over the generally uniform surface of the flats along the San Juan 4.05 miles, to nearly opposite the Colorado branch, where leaving the margin of the river, it is traced 0.80 miles in rear of some conical hills occupying a slight bend in the river directly opposite the Colorado, and with favorable cutting again approaches the river. From this point the line traverses a widely-extended and uniform plain 13.58 miles to the point of crossing the Juanillo, 35 chains above its connection with the San Juan. The surface of this plain opposite the Colorado, is about 8 feet above the surface of the river, and by a quite uniform inclination descends to 1½ feet above the surface of the Juanillo, which has here about the same elevation as the San Juan. The canal is to cross in the channel of the Juanillo, with an average excavation of 3½ feet below its bed,

and a new channel is to be cut on the upper side, and nearly parallel with the line, through which the stream is to be conducted to the harbor. From the Juanillo the line is extended in a northwesterly direction 1.79 miles, and with the exception of an intervening lagoon, requiring about 5½ feet depth of excavation ¾ of a mile, it passes over a low though generally uniform surface, varying in elevation from a few inches below to 1½ feet above the surface of the ordinary high water of the river, to the location of the lower, or lock No. 14, connecting the canal with the artificial harbor. From the junction of the Juanillo, the San Juan, with many windings, takes a northerly direction 2.7 miles to where it changes to the north, and by several channels enters the easterly end of the harbor.

The excavation at the surface of the short canals passing the dams at Castillo, Balas and Machuca, will be in earth; at the bottom the material is rock; at all of the remaining dams the material is a loamy clay with a small proportion of fine gravel.

The peculiar contour of the surface along the line from dam No. 7 to the divergence of the Juanillo is such as to require but few culverts, and no aqueducts will be necessary below the latter point; with the San Juan on one side, and the Juanillo on the other, the country may be drained from the canal in either direction to these streams, consequently these structures will not be required on this part of the line.—*Journal of the Franklin Institute.*

TO BE CONTINUED.

MINING SUMMARY.

Arizona.

TUCSON TO PRESCOTT.

A correspondent of the San Francisco *Bulletin*, in his wanderings over Arizona, thus writes from Prescott, July 8, of his journey to that place and of the mines that are in that vicinity: "My memoranda, obtained from the best obtainable sources, makes the distance between the Territorial capital and Prescott 275 miles. Save a few miles, it is over a wholly natural road, two-thirds of which is remarkably easy of passage. From Sacaton, on the Gilroy river, to Wickenburg, nearly 100 miles, the road is quite heavy, owing to the fact that some is sandy, and the balance passes over earth almost as loose as an ash heap, and the road has only been in use a few months, and has never had the advantage of rains to pack it after being cut up with heavy teams. Generally the road is a mixture of clay and fine stone, with rocky cañons between here and Camp Date creek, and no abrupt hills anywhere. There is one stretch of 45 and two of about 30 miles without water—the first near Tucson, and the latter two between Salt river and Wickenburg. The accommodations on the road for man and beast are somewhat uncertain much of the way, and therefore travellers usually camp out, and can have a hotel wherever they choose. By keeping a lookout for grain it can be had each day for animals, and, as on other routes in the Territory, grass is rarely scarce or inconvenient. But for the danger from Indians, footmen could pass over the whole distance without much fatigue and no suffering. The road is unsafe for small parties, save about fifty miles from Phœnix, on Salt river, in the direction of Tucson. Excepting cottonwood on the Gila and Hassayampa, there are no large trees of any kind until within a few miles of this place. Here pine, oak and other timber is abundant, and of fine quality in about the same proportion as found in timbered sections in general.

FLORENCE AND ADAMSVILLE

Are the only white settlements on the Gila, above the Pimo Indian reservation. They are purely agricultural, and the crops of barley and wheat are very fair this year. The corn is not far enough advanced to determine its relative value. Much corn is not planted until after the wheat is harvested, then put upon the same land, and the two crops made within the year. Barley is frequently allowed to volunteer once. Water for irrigation is obtained from the Gila. The land is very rich. In these two settlements, which really are but one under the name of Florence Precinct, the yield of small grain this year is fully 1,500,000 pounds. Adamsville is a small village, five miles below Florence proper, which consists of but one store, saloon and farm buildings about; it has several stores and saloons, and a flouring mill, whose owners are prospering. They have a large trade with the Pimo Indians, who produce much wheat and change it for goods. These places are both in Pimo county. Tucson, the county seat, and distant about eight miles, partly through a very dangerous Indian country. Application for a new county was made to the last Legislature, but a split on the county seat question, I am told, left them as they are. A county is needed, and should be granted at the ensuing session in January. The Pimo and Maricopa Indians have a large reservation below Adamsville, embracing all the good land on both sides of the Gila for forty miles, and it is mostly arable for miles latterly on either side.

THE VULTURE MINE.

At Wickenburg I had the pleasure of seeing a rare sight—an Eastern mining company turning out bullion far above current expenses. It is refreshing to an old Pacific coaster to witness an operation of the kind. It strengthens his hopes in the future, and is a bright spot in Arizona. Like most all Eastern mining ventures, this was for a long time classed among the losing; and even now it is a wonder that it pays, when all the circumstances are estimated. I doubt if any Pacific coast superintendent would to-day take the Vulture mine and mill and prevent its running in debt. Yet a clever Christian gentleman—B. SEXTON, of the Nutmeg State—is rapidly paying off the old debts of the company, making many improvements, and getting nearly all his ore from shafts and tunnels, in pursuance of a plan of development inaugurated and still continued. The company's ten-stamp mill is at Wickenburg, fifteen miles from the mine, which is reached by an ascending road for eight and a descending one seven miles, the latter end following a narrow cañon, beset with gorges on either side for about three miles, in any of which the Apaches can lie concealed until the passer-by is within a few feet of them. Many attacks have been made in times not far in the past, and men killed and whole trains of mules captured. But for its inviting character to Indians, the road is pleasant to travel, and still the teamsters go over it willingly and take the chances. But, returning to the subject, over this road the ore is drawn to the mill, and every drop of water used in and about the mine, shops, boarding-house, stables, etc., is also drawn from Wickenburg. It is carried in barrels by teams going for ore. An immense sheet-iron tank, like a steam boiler, drawn upon wheels, is filled each day and hauled out half way to water the passing team animals. The hauling of ore and water costs, by contract, $8 per tone of ore. The miners are paid from $50 to $65 per month, in gold bullion at coin rates, and their board included. Mill hands receive about the same. Wood, delivered at the mill, costs $8 per cord; before Mr. SEXTON's management it cost $12, and so with the hauling of ore and water. Formerly supplies were purchased at retail in the local markets; now at wholesale, with no extra cost but freight and commission; there were employed Mexican cooks at the mill, now Chinamen, by which the books show a monthly saving in the provision account of $700. A corresponding recklessness formerly pervaded all branches of the business. Thousands upon thousands of dollars had been expended in superfluous machinery. Now may be seen $35,000 worth of pans thrown aside, which never were needed and can't be used in the business. An efficient mining superintendent was looking for ore under the foot-wall, and upon the whole Mr. SEXTON took charge of the Vulture property in a very discouraging condition. I heard no charges of willful extravagance on the part of his predecessors; no whining in any respect. All was pleasant words, such as ought to follow success. The mining superintendent, Mr. TAYLOR, an old Washoeite, assured me that without any further development he could supply the mill with pay ore for three years to come, and after passing through every shaft and tunnel, I cannot doubt his assertion. Laborers about the mine and mill are promptly discharged for drunkenness, profanity or raising any disturbance among the workmen by tale-bearing or otherwise, when any of these offenses are positively known to the superintendent, and I'm assured that the apparent strictness of this discipline is acceptable to the men. No whiskey mill or gambling den is allowed at the mine, and a store is kept where employés are supplied with needful articles at a trifle above cost. Mr. SEXTON cheerfully expends time to show visitors his operations, but with no view to magnify the value or importance of the enterprise he manages. The company have none of their stock in the market, and don't intend to have it. Governor SAFFORD, Gen. COGGSWELL, JOHN H. ATCHINSON and some other gentlemen, including myself, spent a full day at the mine, and observing the operations in connection with it and the mill.

DATE CREEK MINES.

PRACTICALLY, I can say little of these mines. Excepting on the Mayflower lode, there is scarcely any work done in the district—which is christened Martinez. Some of the finest specimens of gold ore I ever saw, are taken from the shaft on the lode, and it is but seven or eight feet deep. Smaller holes are sunk at different points on the vein, showing good ore, and evidence of a true vein, from two to four feet in width, though, as any miner knows, not absolute proof. There is little indication of silver, and the gold is very fine, and believed to be evenly distribiuted in the ore. Fine specimens are rare, though I accidentally, I suppose, in knocking about with the sledge in the shaft, broke down a real beauty, the rarest ever found in the district. I presented it to my friend, General Coggswell, with the understanding that upon all occasions, when asked from whence it came, he should answer "from an Arizona mine." For certain reasons, I want this matter one of record, though the General is decidedly above suspicion in the matter of observing his agreements. A company had erected an arastra, and were grinding Mayflower ore, the result of which I have not been advised, therefore I know of the result of no working test, and will not go off in any enthusiastic predictions; if warranted, the fact is unknown, but would not be surprised to learn they might have been made truly. Not above a dozen miners live in the district proper, and none at the mines. Probably a few more are at work, but with one exception, only working assessments which are very light—one day on each claim of 200 feet performed within forty days after record, holds twelve months. This easy condition is almost a necessity, as the Indians are prowling all about, and small parties of two to four are hardly safe. No attacks have yet been made, but that is no sign there will not be any day. I examined the assessment holes on the Last Chance, Queen of Palmyra, Cornucopia and other veins that show well upon the croppings. Croppings cover the hills on all sides, and veins appear to be very numerous.

Wood and water are not convenient in abundance. Water for steam-mill purposes may be had quite plentifully within two miles; a fine spring is flowing right in the mines. Date and Martinez creek, each afford some water in the dryest times, and they may be reached by wagon roads in length from one to four miles. Wood is not in greater abundance than about the Vulture mill, where Mesquite commands $8 per cord. The Vulture Company get all their lumber from Prescott, and these Date creek mines must be supplied from here also. Martinez district is twenty-five miles nearer Prescott than the Vulture—the former being about sixty-five distant. Date creek gold leads appear well; they may prove even better than they appear.

GENARAL STONEMAN'S ARRIVAL

to take command of the Department of Arizona, with headquarters at Prescott, last Sunday, was the signal for rejoiciug and firing of salutes by the good people here. General Stoneman talks like a sensible man; no hobbies, no narrow or one-sided views escaped his lips. He seems to amply comprehend the whole situation. He recognizes that we have hostile Indians that must be fought vigorously, and expresses a determination to give them as much fight as his force will enable him, and as quickly and constantly as feasible; more good roads are essential, and he will forward their construction; increased mail facilities are essential, and his influence will be exerted to obtain them. The true value of the country needs representation, and this he will encourage, as he will its general development. He is determined to enforce rigid economy in the service, and thereby endeavor to obtain more troops.

Rains have set in in earnest, and corn crops will be good. Wheat and barley were failures. Rich gold mine reported just found in Bradshaw mountain, thirty-five miles distant. Have visited some mines; when I see more, will speak of them and other items, for which there is no room here.

Oregon.

MINES AT BAKER CITY.

A correspondent of the *Scientific Press*, under date of June 19, writes as follows concerning the mines of Baker City:

"The Rockefellow lode, of which much has been said, was discovered by accident. An express rider, by name ROCKEFELLOW, on his way home from Umatilla to Idaho, found his horse lame at this place, and on dismounting to look at the horse's foot, picked up a rock which proved to be a specimen of quartz containing an abundance of free gold. He made up a prospecting party and came back, and soon discovered a rich and well-defined quartz ledge. The first rock worked yielded $150 to the ton in gold, and no attention was then paid to the silver glance (sulphuret) which the present owners, BROWN & Co., now find quite abundant. Messrs. BROWN & VIRTUE have worked their ledge down some 300 feet to the water level, taking out ore enough to keep a ten-stamp mill running night and day. They are now preparing to erect a steam pump for the purpose of freeing the mine of water. Our correspondent visited the place in company with Mr. VIRTUE. The greater part the remainder of his communication we give in his own words. 'The width of the ledge at the present depth is two feet, and the ledge is as well defined (between the walls of porphyry (?) mixed with slate) as I ever saw. The rock that has been taken out recently averaged $35 to the ton of free gold, and the sulphurets have assayed $150 per ton. They now employ ten men. Their mill is eleven miles from the mine on East Powder River, which stream contains water-power enough to run fifty mills, such as the Rockefellow. It is surprising to me that more rich ledges have not been struck in the vicinity of Baker, for the placers are very rich and much quartz has been found in the placer mines that was rich with free gold. It is my impression, however, that, as the country becomes more developed, many rich veins of both gold and silver will be found in this county. In the placer mines in the claim of CALDWELL & Co., at Gimletville, they found a few weeks ago a nugget valued at $3,900. A claim at Eagle Creek, in the same county, ran forty-two days and cleaned up $4,200. A Chicago company are now negotiating to buy what is known as the Burnt River ditch, and propose enlarging it so as to supply steady water to the El Dorado and Amelia City, and other rich districts. The scarcity of water only prevents the mines in this locality from giving surprising proofs of their richness, and if they were 4,000 miles away, there would be a grand rush to them. There have been shipped from Baker City, during the month of May last, $150,000 and upwards of bullion, and for the year ending June 1st, 1870, over $450,000. At least $150,000 has left this place in private hands during this time. A great drawback to traders in Eastern Oregon is the scarcity of coin, and the very high rates that are charged in making the exchange. My old friend, Capt. FISK, is engaged in the assaying business in Baker, and he informs me that it costs from three to four per cent. to get coin from your city. The captain has promised to keep you posted on this section of the country, and for fear I should make this letter too long and tedious to you, and deprive the captain of some of his intended items, I will bring it to a close by saying that I was well pleased with everything in Eastern Oregon.'"

Montana.

CABLE CITY.

The Deer Lodge *Independent*, July 30, is informed that "the mill at Cable City is still pounding away on excellent quartz. Mr. CAMERON employs some fifty men about the mill and mine. But two clean-ups have been made since the hoisting works were put in operation, but the amount of ore in sight warrants the belief that there is no cause to apprehend that the mill will again be compelled to lie idle for the want of quartz. Mr. AIKEN, who has charge of the Miner's & Mechanic's Tunnel, thinks that less obstacles will be encountered in future in driving the tunnel, as the rock is much softer than heretofore. He is much encouraged by these favorable indications, and thinks that the ledge is not far distant. We trust that this may prove true, and that ere many weeks they will be taking out rich ore. Mr. JAMESON, at Georgetown, is working a number of men in his placer mine, and is making money. He has plenty of water, plenty of ground, and indomitable perseverance, and is bound to make his fortune. Several men are crushing rock in arastras near the head of Flint creek, which is paying about $45 per ton. They have plenty of that kind of rock, and cannot fail to be handsomely rewarded for their enterprise."

HIGHLAND.

Mr. CHAS. DELORIMER, of Highland, communicates to the *Independent* the following items from that place and vicinity: "The Nevins Company are running one arastra, and are taking out more money than ever before. The Only Chance Company have three arastras running, and are doing as well as heretofore. Although they are down to a great depth upon their ledge, there is no diminution in the quantity or quality of the ore. The various bed-rock flume companies are not doing as well as was anticipated, on account of the scarcity of water. FRANK BECK's silver mine, on the Big Hole river, is yielding some of the richest ore ever found in the county—some claiming it to be even superior to that taken from the 'Day' and 'Harvey' ledges. DAY & HARVEY are erecting a Chili mill and an arastra on Moose creek. When completed, they expect to make some fabulous sums. At present the ledges show a better quality of ore than that heretofore taken out. PARKER & DICKEY's new arastra is running with splendid success, on rock from the 'Dixie' lode. The rock carries free gold, and is said to yield about $45 per ton.

NEW MINES.

The *Montanian* chronicles the discovery of very extensive placer mines, extending from the Eight Mile House down the valley to Combs' Ranch. An experienced miner tells the editor "that there are thousands of acres that will prospect from three to ten cents per pan." This news is too good to be true. There is little doubt in our mind that the table lands on the Stinkingwater contain much gold, and it is not unreasonable to suppose that some spots will be found there that will pay well. If this should prove to be the case Madison county will again take a prominent place among the gold producing counties. Upon the ground mentioned above, plenty of water can be brought at no great expense.

Colorado.

THE WORKS OF THE WESTERN SMELTING COMPANY.

We find in a Colorado paper the following account of the new smelting works now being erected under the direction of Mr. WEST: "The works of the Western Smelting Company, on the site of the old Dubois mill, North Clear creek, are being pushed under the direction of Mr. W. WEST. The ore is to be desulphurized without crushing, in kilns of the same pattern that have been in use some thirty years in producing sulphuric acid. The ore is fed in at the top, and drawn from the bottom as in a lime-kiln. No fuel is requisite after the kilns are once started, the fires being sustained by the sulphur in the ore. After desulphurization, the ore is matted in a cupel furnace, then re-roasted and re-smelted, for the purpose of concentration. This produces a matte carrying ordinarily from $1,000 to $3,000 per ton, in gold and silver, and about fifty per cent. of copper, varying, however, materially, according to the quality of ore. Mr. WEST, who is a Swansea man, intends to do the separating at these works, instead of shipping it to Swansea, estimating that the cost will be even less than that of transportation, and that the whole expense of the Swansea separation will thereby be saved. It is the intention of the company to put up a sulphuric acid chamber in connection with the kilns into which the sulphurous acid will be gathered, and by the requisite addition of nitrate of soda, to produce sulphuric acid at an expense of one-fourth of a cent per pound. This acid will be used in the separation of the matte. The capacity of the works is intended to be ten tons every twenty-four hours

The kilns are expected to be ready to commence roasting next week."

MISCELLANEOUS ITEMS.

From the Georgetown *Miner*, which, by the way, is always well, filled with interesting and readable mining items, we glean the following: "Arrangements have been consummated that will result in the construction of an Arey furnace near Montezuma, in Summit county. A specimen of Snow Drift ore, weighing twenty-five pounds, was sent to the Commissioner of the General Land Office at Washington, and the certificate of assay returned gave a yield in silver of $1,950 per ton. From Summit county are the following items: There are about seventy-five men engaged in placer mining in Union District, with satisfactory results. ILIFF, POLLOCK & Co. have struck bed-rock in French Gulch that pans out rich. Mr. MARTIN was the fortunate finder of a nugget weighing ten ounces, in digging near Lincoln, at the head of French Gulch. Rich hill diggings have been discovered between the head of Nigger and Illinois gulches. R. O. OLD, Esq., superintendent of the Terrible mine, furnishes that paper with the record of that mine during the first quarter, comprising the months of April, May and June, under the new management: 'The yield of second-class ore, during the period stated, has more than paid all expense of work done at the mine. The value of the first-class ore shipped to England, and now on hand, sacked and weighed, and ready for shipment, is $24,375. The average of the first lot shipped to England was 500 ounces to the ton. Value of third class ore now on hand, less the cost of treatment, $8,625. Total profit for the first quarter, $33,000, or $10,000 per month.'"

California.

INYO COMPANY FURNACES—CERRO GORDO.

THE *Independent* says: "The furnaces at Cerro Gordo and Swansea on Owens' Lake, ship over 200 tons of bullion monthly, on the average. There are nine quartz mills and four furnaces in the county, besides about twenty arastras. Most of the mills are idle. They were erected before the ores were understood. The Eclipse mine, twelve mile from Independence, in the Inyo mountains, is being worked by an English company, which is now putting up expensive machinery. The works of BELSHAW & ELDER consist of two reverberatory slaging furnaces, two blast-furnaces, crusher, an improved Root blower, and a six-horse engine and boiler. C. F. HAHN, while making a cut to the series of ledges discovered by him in 1869, discovered another which he named the Wittekind. It is now considered one of the best in camp. The Cumberland is still richer, though smaller. Work progresses upon both, and they grow richer as they descend."

THE MAYFIELD MINES.

THE San Jose *Independent*, July 25, says: "These mines are situated on the headwaters of Stephens' creek, at a distance of about ten miles from Mayfield, easy communication being secured by means of a daily stage, which leaves the latter place every morning for the mines. Claims that are worked pay $2 to $3 with the pan alone, and the indications are, that if worked properly they will yield a rich harvest. Our reporter says he saw some fine pieces of gold which were taken from the diggings, several of which would weigh from $3 to $4. The town of Mayfield is deserted and quiet, the inhabitants having been severely inflicted by the gold fever."

EUREKA MINE.

THE Grass Valley *Union*, of July 21, says: "While the Eureka mine was making regular runs of about $2,000 per day, we did not care to notice the fact. Since our report from the mine a month ago, the yield has not fallen under these figures. On Tuesday last the semi-monthly meeting occurred, and the yield from the mill was put into bars. Eleven day' run of the mill gives about $30,000, not including sulphurets. The eleven days' run up to and including last Saturday, is one of the largest Ajax has ever made."

Michigan.

FIRE AT MINNESOTA MINE.

A correspondent of the Lake Superior *Miner*, July 23, gives the following particulars relating to the recent fire in the Minnesota mine: "As you have already noticed the fire under ground at the Minnesota mine, I would only say in regard to it that it is, or was about the 100-fathom level of No. 2 instead of No. 6 shaft. Capt.' JAMES, after ascertaing the position of the fire, and the improbability of applying water for its extinction, ordered at once that the outlet of the several shafts connected with No. 5, and of No. 2 itself, should be covered over as air-tight as possible, to prevent the current of air playing on the fire, which experiment proved at once effectual, as the smoke has ever since rapidly decreased, and there is no doubt but that the fire is extinguished by this time, and that the mine will be opened again to-morrow, and after short ventilation the miners will be able to resume work. This is indeed a fortunate escape for the company and tributers, as, judging from the amount of smoke ascending from No. 2 shaft and spreading over the hill like a cloud of fog, the fire must have gained much of an extent. Fortunate, too, that the east wind prevailing, enabled Capt. JAMES and party to ascertain the locality without exposing them to the smoke, and that a successful remedy was at once applied." The same paper has these items of news: The product of the National mine for the month of June, 1870, as reported to us by N. GRIFFIN, Esq., clerk, was 23 tons and 1,560 pounds, divided as follows: Masses, 12 tons, 1,535 pounds; barrel work, 1,572 pounds; stamp work, 10 tons, 453 pounds. The Calumet and Hecla Mining Companies, of Portage Lake, have each declared a dividend of $5 per share, payable August 5th.

LATER.

The *Miner* of July 30 says of the Minnesota fire: "As predicted, the tribute work at the Minnesota mine was resumed on Wednesday, the mine being opened for ventilation on Monday. The road in the No. 2 shaft, and a small part of the timber, was partly destroyed by the fire for about three levels upward and one level downward from the 100-fathom level, and are now under repair."

Nevada.

CENTRAL DISTRICT.

The Humboldt *Register*, August 6, has from reliable authority the following particulars relative to the mining prospects of Central District: "This mining district is located about four miles west of the Humboldt river and six miles from Raspberry station, on the Central Pacific Railroad. Wood and water are abundant in the immediate vicinity of the mines, and a good natural road extends from the river to the mineral veins, which are rich, well-defined and extensive. The principal ledges, comprising the Arnold and Railroad, were discovered and located and are now owned by the CLARK Bros., MULLEN & ARNOLD, all old miners and Humboldters. The developments made in the district warrant the belief that the mines are the richest and most extensive of any yet discovered in the county. The Arnold is developed by a shaft 77 feet deep, and presents that entire distance a ledge of uniform width containing about three feet of rich chloride and sulphuret ores. The Railroad claim has been developed at various points along its entire length, from five to fifty feet, and shows a vein varying from one to ten feet in thickness. The ore from these mines assays from $2,500 to $3,800 per ton, and is unquestionably among the richest yet discovered in the county. Arrangements are now being made for the development of the district, which, if carried out, will add materially to the prosperity of the whole community. Col. G. M. OGDEN, of Ohio, who has examined several mines in different districts throughout the State, with a view of purchasing and developing the same, has selected the Arnold and Railroad in this district, and will commence active operations in a few weeks.

INCORPORATED.

The Galena Smelting Works concern has incorporated in Virginia City, for operation in Humboldt county. Capital stock, $300,000. Trustees—A. M. EDGINGTON, J. H. T. MARTIN, S. W. CHUBBUCK, A. T. BRUCE and J. P. MARTIN. The *Enterprize* says the company has one 15-ton furnace in operation, and another almost completed.

Washington Territory.

THE SEATTLE COAL MINES.

A correspondent of the San Francisco *Bulletin*, writing from Seattle, July 16, says of these mines:—"About ten miles east of this place are the Seattle coal mines, which produce, I am told, a better quality of coal than any other in this territory, or, as experts say, on this coast. You have tested this coal in the *Bulletin* office to drive your steam presses, and know its excellent quality by trial. I visited these mines a few days since, and saw what the company are doing. There are four distinct veins, varying from four to nine feet in thickness, and extending for a mile and a half on the company's land. I may here add that the extensions of these veins run an unknown distance eastward on the lands of other parties. On one side of these veins a tunnel has been run in, a distance of 600 feet, with suitable chambers and 'shutes,' and a tramroad for drawing out the coal. This tramway extends about three miles westward to Washington Lake, a beautiful sheet of fresh water, 25 miles long by about three or four miles wide. The western border of this lake is some three miles east of Seattle. By the 1st of August next this tramway will be ready for use, and by that time means will be at hand for shipping to this port. The company will then be ready to deliver from 50 to 200 tons of coal per day at their depot, on the eastern shore of Lake Washington, according to demand, and the facilities for trans-shipment thence. It will be brought to Seattle by contract, and from here ships will take it direct to your city. Negotiations are now in progress to bring it here in steamboats at a fair rate per ton."

ON DIT ABOUT MINES AND METALS.

The Burro Mines.—California and Nevada papers assert that Burro Mines are a private speculation, in the interest of a sharp San Francisco speculator.

Bullion.—The following amounts of bullion passed through Wells, Fargo & Co.'s office, in Elko, Nevada, from the 3d to the 6th of July, inclusive: From Idaho, $44,404; Cope, $3,054; White Pine, $15,665. Total, $63,123.—*Chronicle.*

Tin in Montana.—The Montana *Herald* says that GEO B. FOOTE has made a bar of tin in Helena from ore found within thirty miles of that place, which yields nearly 25 per cent. of pure tin. The lead is said to be promising. This is the first tin ever produced in Montana.

Colorado Ore for England.—The value of first-class silver ore from the Terrible mine, Colorado, shipped to England, and now on hand, sacked and weighed, and ready for shipment, is $24,375. The average yield of the first lot shipped to England was 500 ounces per ton.

Snake River Mines.—A correspondent of the Boise *Chronicle* writes as follows from the Snake river mines: "Provisions of all kinds are much cheaper than in Boise city—flour, $8 per sack; peaches, dried, 15c.; beans, 12c.; hams and sides, 30c.; coffee, 40c.; tea, $1 25; potatoes (old) 4c.; clothing cheap; lumber, 20c. a foot and scarce. Every claim-owner is on the sell at from $50 to $250, and cayuse ponies are legal tender, there not being any money there, and when work is in full blast the chances are it will still be pretty scarce."

Western Iron Furnaces.—The wages paid by the Western Iron Company, whose furnaces are situated at Knightsville, Indiana, are as follows: Common laborers receive $1 75 and $2 per day; puddlers $4 50 and $5 50; the head puddlers and heaters receiving $6 50 and $7 50. Two hundred and twenty-five tons of coal per day are used in the mill and furnaces. The company own about half a million of switches. The capital stock is $300,000. Work was commenced in April, 1867, and the first furnace was put in blast October 13, 1868. The rolling mill commenced operations October 26, 1868. They have two upright engines of large power. It is estimated that forty tons of pig iron per day are smelted. The furnace and mill employ 200 men.

Iron Works at St. Louis.—The *Republican* describes the Vulcan works now building. It says: "There are to be fifty-four furnaces—heating and puddling—three large engines, with fly-wheels, and weighing 90,000 pounds each, besides six other engines of different sizes, to suit the work to be performed by each. The rolls are to be twenty-two feet in diameter, which will enable the company to make steel rails when it is deemed advisable. The whole is to have a capacity for turning out one hundred tons of new rails per day, on what is termed a single turn, or about one hundred and seventy-five tons on a double turn (night and day). We expect to see the mill in operation by the 1st of next January, and giving employment to fully three hundred persons."

Quincey Granite Quarries.—Scarcely a State in the Union but what has obtained more or less building material from this place. These quarries rank among the first, if not as the first in the country, in interest and value, and for several miles west from the town immense derricks are erected all along the line of quarries, and thousands of men are employed excavating and preparing the granite for building purposes, by hewing and shaping it according to order, for it must be remembered that the material for whole buildings is here shaped before it leaves the sheds adjoining the quarries. This granite is susceptible of a very fine polish, given by rubbing it with iron. We were shown the shaft of a monument polished in this manner, and costing $2,700, not including the cost of transportation. Here, also, we saw the first railroad built in the United States, and called the Quincey Granite Railroad. It was built by WILLIAM BRYANT, for the company, in the year 1826; the cars being drawn by horses. The road was originally two miles in length, but about a mile has been added since it was first built. They have but one inclined plane, where the force of gravity is utilized. One car loaded going down the planes being made to draw another one empty up.—*Correspondent Mauch Chunk Gazette.*

MISCELLANEA.

Kerosene Lamps in Mines.—The Director of the Saline works in Austria, ED. WINDAKIEWIEZ, has introduced kerosene lamps in the mines, on account of their much greater luminosity when compared with candles or the common smoky oil lamps. He found that a good kerosene lamp, containing four ounces of petroleum, was as effective as five lamps, containing each three ounces of rapeseed oil.

A Steam Paving Machine has recently been introduced in Paris, and made use of by the municipality for the repair of the streets there. This machine consists of a small steam engine on wheels, drawn by one horse, to the rear of which is attached the "pavior," which is forced upon the ground with great force by a blow from the piston, and slides on a bar some six feet long, and can thus be directed by the driver to any stone which requires forcing home. The machine is now at work in the Rue de Grenelle, St. Germin, and is considered a success.

A Speaking Machine.—FABEN'S speaking machine is attracting attention in Germany. It pronounces each letter distinctly, and even laughs and sings. German philologists have heretofore declared it to be impossible to imitate the letter I (as pronounced in German) by artificial means, but this machine speaks the word Mississippi very plainly. During a performance at Berlin, a slip of paper containing the words "Long live King William of Prussia!" was handed to Mr. FABER, and correctly pronounced by the machine, whereupon there was a great deal of applause.

Pasting Parchment Paper.—Some of our readers may have experienced a difficulty in securing the adhesion of sheets of parchment paper, especially in making envelopes, bags, etc. It is now announced that if the surfaces, before being joined, are first moistened with dilute alcohol or other spirits, and ordinary paste be then applied, they will adhere with great tenacity. We may also introduce a strip of unsized paper, coated with paste, between the two pieces of parchment to be joined, and then pressing all three together, each surface will adhere firmly to this intermediate piece.

Water-proof Glue.—One ounce of gum sandarac, and one ounce of mastic are to be dissolved together in a pint of alcohol, to which an ounce of white turpentine is to be added. At the same time a very thick glue is to be kept ready, mixed with a little isinglass. The solution of the resins in alcohol is to be heated to boiling in a glue pot, and the glue added gradually with constant stirring, so as to render the whole mass homogeneous. After the mixture is strained through a cloth, it is ready for use, and is to be applied hot. It dries quickly and becomes very hard, and surfaces of wood united by it do not separate when immersed in water.

Melene as a Lubricator.—An insuperable difficulty attending the use of ordinary lubricators, is their decomposition at high temperatures, leaving behind a thick vascid coating, which, especially in cylinders, interferes considerably with the motion it should assist. ERICSSON'S hot air engine is especially difficult to lubricate, from this cause. The use of "melene" is advised for this purpose; it being a substance obtained from the paraffines, insoluble in water, soluble in the fixed oils, volatile without decomposition, not boiling under 370°, of the consistency of wax at ordinary temperatures, and floating on the surface of cold water. It is cheap enough to be used on a large scale, and preserves from oxidation and adhesion.

India-Rubber Inexhaustible.—The belt of land around the globe, 500 miles north and 500 miles south of the equator, abounds in trees producing the gum of India-rubber. They can be tapped, it is stated, for twenty successive seasons without injury; and the trees stand so close that one man can gather the sap of eighty in a day, each tree yielding, on an average, three tablespoonfuls daily. Forty-three thousand of these trees have been counted in a tract of country thirty miles long by eight wide. There are in America and Europe more than 150 manufactories of India-rubber articles, employing some 500 operatives each, and consuming more than 10,000,000 pounds of the gum per year, and the business is considered to be still in its infancy. But to whatever extent it may increase, there will still be plenty of rubber to supply the demand.

Interesting Experiments.—Somebody is always discussing something new or developing half understood facts. One of our exchanges gives in a late issue the result of several very interesting experiments made with a glass-mounted thermometer in testing the heat of the sun's rays. In the various tests made, it was found that in the house with open windows the mercury stood at 90.20. Out of doors in the shade it stood at 95, and not quite five degrees higher in the sun. In the same position, with wet bulb, it stood at 98.8; with bulb covered with white cloth, 95.5; and with bulb covered with black silk, at 109.96. Laid upon the grass in the sun, it rose to 104; upon white cloth in the sun, 105.8, and upon black silk, 113. These experiments show conclusively the utility of light-colored clothing for those who are obliged to be exposed to the direct rays of the sun at high temperatures—and the experiment with the wet bulb shows as clearly the value of free perspiration in keeping down the temperature of the body, which, however, the observer finds in his own person, notwithstanding the profuse perspiration while making these experiments, to have risen to 100.7, which is about two degrees above the usual standard for cooler days. The average temperature of the healthy human body throughout the year, in temperate climates, is 98.5, while in tropical regions it is about one degree higher.

Nautilus Life-Belt.—A new form of safety belt, called the Nautilus Belt, has recently been invented by Count LIANCOURT; and it is said to have many advantages over those of the ordinary form. The skin of the belt is of linen, two layers of which are cemented together by an India-rubber solution, a coating of which is also laid on the outer surface. This skin or bag encloses a spiral spring, the coils of which are soldered at one end, so that the spring is of the form of the figure 8. The ends of the belt are of wood, oval in form, six inches deep one way, and three inches the other. One of the wooden ends is fitted with the valve opening inwards, and as the belt is drawn out the air enters and inflates it, the valve of course closing to prevent its egress. In this condition it is fastened around the chest by a metallic link, a cork being inserted in the valve-hole to prevent the possibility of the entrance of water. After use the belt is removed, the finger inserted in the hole of the valve and the apparatus compressed, by which means all the air is expelled, and the belt closes up in the space of seven inches by six, forming a light compact body. The action is thus seen to resemble that of a concertina, the keys of which answer to the valve in the belt. Experiments made with this belt are said to have been entirely satisfactory, a man being sustained by it, well out of the water, in the most trying position. In fact, he found himself unable to remain under the water in spite of all his efforts to do so,

MARKET REVIEW.

The Coal Trade.

NEW YORK, August 19, 1870.

WHOLESALE.—The trade this week presents many marked features, at least to one who carefully notes the indications of the market. The amount of coal coming to tide-water has increased materially since the resumption in Schuylkill, and, as far as we can learn, is being taken as fast as it arrives. This increased tonnage tends, in a very great degree, to ease the market, as it gives dealers an opportunity to meet the demand, which, up to this time, has been largely in excess of the supply. The demand for Lehigh is very good, all that can be got is taken as fast as it arrives. Broken and Egg are in as good demand as Stove, and in these three sizes there is great activity. The softer coals, though not as active, are as much so as could be expected, and perhaps more. When the resumption took place people were looking for a great break in prices. This did not take place, as was anticipated, while, on the contrary, there was an advance. The fact is, the prices of coal were so low that they could not recede further, and now that we have a renewed supply, we have a strong demand to meet it. Let us see what result is expected. For a long time prices have ruled very low, people have restricted consumption, and the retail dealers have exhausted their stocks and bought "from hand to mouth" to prevent an advance. But a short time before the resumption a slight advance is brought about by those who were too frightened to wait, or perhaps those who could not. Now we have an abundant supply, but people are frightened at the market, low as it is; they will probably wait for a week or two longer, until they *must* have coal at any price, and then rush in and buy. The result is easily seen, prices go up, stimulated on the one side by the demand, and on the other by the interest of the dealer and the consumer, who is "stuck" by his own foolishness.

In view of the advance in tolls on the Reading, on the first prox., which will probably be 50c. per ton, we do not see how it is possible for Schuylkill coal to be sold at less than the current quotations. Hence, our advice is to dealers and consumers to buy steadily now. Accumulate stock ahead to meet the requirements of the fall trade, and by this means assist in preventing any speculative advance in the autumn months, when, under the presence of an active demand from consumers, you would be compelled to enter the market and purchase on the best terms you can, unless you prepare in advance by previous purchases for this demand, which always is the case.

RETAIL.—The retail trade is extremely active, and we may consider the fall trade fairly begun. We quote: Lackawanna at $6 50; Chestnut, $5 75; Schuylkill, $7 to $7 50.

FREIGHTS.—Remain unchanged. Vessels in moderate supply. At Philadelphia there is quite a scarcity of vessels for Eastern ports. Freights are quoted as high as $2 70 to Boston.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending August 13, 1870, compared with week ending August 14, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R.	99,931	2,040 328	107,747	1,422,498
Schuylkill Canal	8,763	4 7,961	15,002	87,959
Lehigh Valley R. R.	66,004	1,385,212	59,994	1,944. 81
Lehigh & Sus. R. R.	23,274	453,8-5	19,711	592,382
Lehigh Canal	37,435	381.181	24,250	352,293
Scranton North	294	207,956	19,740	445,12)
" South	4,143	617,702	33,775	1,068,694
Penn. Coal Co., rail	21,432	58 ,90	22,906	698,145
" " canal	1,077	10,595	958	11,474
Del. & Hud. Canal Co.	15,2-5	647,185	57,670	933,387
" " R.R.	1,224	102,769	7,367	284,146
" " south		51 174	12 0-8	283,042
Shamokin	15,454	2.9,4.1	13,859	243,001
Trevorton		11,161		47,852
Lykens Valley Coal Co.	1,98*	41 662	2,817	70,847
Wyoming South	12,323	145,-48		142,2-5
Wyoming North	2,868	7,666		
P. N. Y. C. & R. R. Co.			5,730	184,715
Williamstown. Co'y.	6,631	109 563	6,790	178,281
Short Mountain	2, 45	62,564		
Total	321,018	7,504,928	440,374	9.0 2,383
1869			321,018	7,504 928
Increase week and year			89,356	1, 17,455

* Less coal transported for Company's use and Bituminous coal

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Aug. 13, 1870, compared with week ending August 14, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	22.000	592,000	20 289	575,655
C. & O. Canal	17,0.0	341 000	15,956	362 013
H. & B. T. R. R.	....	204,324	....	179,848
Harrisburg & D.	12,751	....	13,181	481,773
L. V. R. R.	....	552	....	9,389
P. & N.Y. C. & R. Co.	....	....	6,132	151,585
	....	....	....	....

Schuylkill Coal Trade.

Report of Coal transported via the P. and R. R. for the week ending Aug. 13, 1870—less coal carried for Company's use, and Bituminous Coal:

For week	107.747 06
Previously this year	1,3 4 751 13
Total	1,4-2,498 19
Same time last year	2,040,328 09
Decrease	617,829 10
Amount sent same week 1869	99,991 03

Report of coal transported over the Schuylkill Canal for the week ending Thursday, August 11, 1870.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	14,251 00
" Port Clinton	751 00
Total for week	15,002 00
Previously this year	72,957 00
Total	87,959 00
To same time last year	417,961 04

Amount of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, August 11, 1870:

From St. Clair	40,066 13
" Port Carbon	7,693 10
" Pottsville	5,094 08
" Schuylkill Haven	33,383 00
" Auburn	5,591 02
" Norristown	— —
" Port Clinton	15,704 13
" Allentown and Alburtis	304 00
" Harrisburgh and Dauphin	13,181 18
Total paying freight	120,929 04
Coal for Company's use	2,841 15
Total for week	123,7-0 19
Previously this year	1,804,240 17
Total	1,928,011 06
To same time last year	2,409,157 19

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, Aug. 13, 1870.

	WEEK.	SEASON.
North	45,218 14	1,391,761 02
South	12,088 04	283.041 18
Total	57,306 18	1,674.803 00
Corresponding time in 1869.		
North	2,552 07	72),127 06
South		49 457 04
Total	2 552 07	769.5-4 10
Increase North	42 666 01	Increase 67 ,633 16
Increase South	12,088 04	Increase 233,584 14
Total Increase	54,754 11	Increase 905.218 10

Report of Coal Transported over Lehigh Valley Railroad

For the week ending August 13, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	9,086 06	408,097 05	417,183 11
" Hazleton	46,065 13	1,305.059 15	1,351,124 08
" Upper Lehigh	503 15	8,707 19	9.211 14
" Beaver Meadow	19 492 15	468,530 12	488,0.3 07
" Mahanoy	6,949 04	149,444 18	156,394 03
" Mauch Chunk		447 17	447 17
Total Anthracite	82,097 13	2,340,287 06	2,422,384 19
Bituminous Coal rec'd from Cata. R. R.			
N. C. R. R.			
E. P. R. R.		9,380 00	9,380 00
P. & N.Y. C. & R.R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	82,097 13	2.349,667 06	2,431,764 19
Same time last year	84,507 18	1,516,131 19	1,6-0,639 17
Increase		833,535 07	831,125 02
Decrease	2,410 05		
Forwarded East from M'h Chunk by rail	59,994 08	1,884,389 18	1,944,384 06
Same time last year	66,004 18	1,319,.07 16	1,385,212 12
Increase		565,182 02	559,171 14
Decrease	6,010 08		

RECAPITULATION.

Forwarded East from M'h Chunk by rail	59,994 08	1,884,389 18	1,944,384 06
To N. C. R. R., at Mount Carmel	253 10	678 07	931 17
Forwarded North from L. & B. junction	5,720 07	178,523 19	184,244 06
To L. & S. R. R. at Packerton for rail	159 12	5,047 01	5,206 13
Delivered at M'h Chunk	15 16	802 16	818 12
Delivered on line of road above Mauch Chunk	62 16	7,613 07	7,676 03
Delivered above M. Chunk for use of L. V. R.R.	1,069 00	35,028 15	36,097 15
To L. & S. R.R., at P'n Hav., for railroad			
Do. for canal	9,545 12	152,315 04	161,860 16
At M.Chunk for canal	5,276 12	75,857 19	81,134 11
Total Anthracite	82.097 13	2,340,287 06	2,422,384 19
Bituminous Coal		9,380 00	9,3 0 00
Total all kinds	82,097 13	2,349 667 06	2,431,764 19

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending August 13, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct.	WEEK, 1869. tons ct.	YEAR 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	29588 13	24895 00	725101 1-	431305 13
Upper Lehigh Region	3754 1-	2957 01	86756 08	70070 17
Mahanoy Region		81 00	887 08	1907 01
Hazleton Region	9912 09	11206 12	16-236 05	1056.0 05
Beaver Meadow Region	5278 12	62.3 18	611 3 14	600 6 09
Mauch Chunk Region	1560 06	10221 12	34010 03	199046 03
Totals	50482 13	61999 03	1096115 11	874346 08
Increase			221769 03	
Decrease	11516 10			
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	19711 10	23.71 02	593382 17	453885 12
Forwarded East of Mch Chunk by Canal	24230 17	37435 03	352293 1-	381181 01
Delivered at and above Mauch Chunk	787 02	287 18	25439 00	19135 06
Delivered to L. & B. R. at PlymouthBridge	5753 05	1005 00	125999 15	14 93 06
L. V. R. R. at Sugar N.				5.51 03
Totals	50482 13	61999 03	1096115 11	874346 08
Of the above there was transported on acc'nt of L. C. & N. Co.	1950 06	17289 14	50664 0-	218639 10
W.-B. C. & I. Co.	14250 03	13218 19	32-451 0-	22-774 05
Totals	16200 09	30.08 13	377115 06	448611 15
Increase				
Decrease	14308 04		71496 09	

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending August 11, 1870:

	Tons.
For week	12,181 18
Previously this year	468 591 10
Total	4-1.773 08
Same week last year	12,-51 14

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via the Pennsylvania and New York Canal and Railroad Company, for week ending August 10, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	5.720 07	178,9-5 11	184,715 18
Bituminous	6,132 09	145,453 00	151,585 00
Total, Ant. and Bit.	11.852 07	324,448 311	36,300 18

Shipments of Cumberland Coal

for the week ending Saturday, August 13, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M.	.....	.....	.....
Borden	1,217 14	1,878 04	3,095 18
Consolidation	2,330 06	5,679 14	8,010 00
Spruce Hill	658 08	.....	658 08
Midlothian	469 11	1,359 06	1 828 17
H. and Baltimore	17 15	547 09	565 04
do Va M	290 08	.....	290 08
V C & I Co	1,010 15	.....	1,010 15
G. C. C. and I.	809 07	.....	809 07
Maryland	2,487 12	3,779 10	6,267 02
American	802 04	2,712 02	3,514 06
Atlantic	1,059 08	.....	1,059 08
Piedmont	1,162 00	.....	1,062 00
Swanton	1,046 09	.....	1,046 09
Barton	900 00	.....	900 00
Potomac	1,098 02	.....	1,098 02
Franklin	2,347 18	.....	2,347 18
Big Vein	2,581 07	.....	2,581 07
Total week	20,289 04	15 956 05	36 245 09
Previous	555,366 12	346,056 17	901,423 09
Total year	575,655 16	362,013 02	937,668 18

Statement of coal transported over the Cumberland and Pennsylvania Railroad during the week ending Saturday, Aug 12, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL. Tons.	C. & O. CANAL. Cwt.	B. & O. R. R. Tons.	B. & O. R. R. Cwt.	TOTAL. Tons.	TOTAL. Cwt.
1870	14.162	11	16,961	19	31,124	10
1869	17,635	19	22,681	13	317	12
Increase						
Decrease	3,473	08	5,719	14	9,193	02

YEAR.

YEAR.	C. & O. CANAL.	B. & O. R. R.	TOTAL.
1870	3 9,528 16	506.540 16	816 069 12
1869	341,600 15	59- 387 07	933 988 02
Increase	32 071 1-	85,846 11	117,918 10
Decrease			

Statement of coal transported over the Eckhart Branch Railroad, during the week ending Saturday Aug. 13, 1870, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL. Tons.	C. & O. CANAL. Cwt.	B. & O. R. R. Tons.	B. & O. R. R. Cwt.	TOTAL. Tons.	TOTAL. Cwt.
1870	1,793	14	2,026	02	3,819	16
1869	2,41-	12	3,085	01	5,501	13
Increase						
Decrease	622	18	1,058	19	1,681	17

YEAR.

YEAR.	C. & O. CANAL.	B. & O. R. R.	TOTAL.
1870	57,067 15	61.744 14	118.812 09
1869	41,385 14	63,55- 16	104,942 10
Increase	15,682 01		13,869 19
Decrease		1,812 02	

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, August 18. R.	A.	W.	A.	AT PHILADELPHIA, August 19. R.	A.	W.	A.
Lump	$—	—	$5 00		5 00		4 50	
Steamer	—	—	5 00		—	—	4 50	
Broken	—	—	5 25		—	—	4 50 to	—
Egg	5 75 to	6 25	5 25		—	—	4 75 to	—
Stove	— to	—	5 75		—	—	4 75 to	—
Chestnut	4 50 to	5 40	4 75		-		4 25 to	—
Pea	—	—	—	—	—	—		—
LEHIGH.								
Lump, (along side)	6 00		—	—	—	—		—
Broken	5 75		—	—	—	—		—
Egg	5 60		—	—	—	—		—
Stove	6 00		—	—	—	—		—
Chestnut	5 25		—	—	—	—		—
Pea	—	—	—	—	—	—		—
SPECIAL COALS.*	R.	A.						
Diamond Vein	—	—	—	—	—	—		—
New England	"	"	—	—	—	—		—
Locust Dale	W.	A.	—	—	—	—		—
Honey Brook, Leh'h	W.	A.	5 25 to	6 00	—	—		—
Spring Mountain	"	"	5 25 to	6 00	—	—		—
Sugar Creek	"	"	5 25 to	6 00	—	—		—
Sugar Loaf	"	"	5 25 to	6 00	—	—		—
Old Comp'y's	"	"	5 25 to	6 00	—	—		—
Cross Creek	"	"	25 to	6 00	—	—		—
Enterprise	"	"		—	—	—		—
Girardville	"	"		—	—	—		4 75
McMichael	"	"		—	—	—		4 75
Shamokin	"	"	5	50	5 25			—
Lykens Valley	"	"		—	5 25			—
Broad Top	"	"	5	50	—	—		—
Hill & Harris	"	"		—	4 75			—
Henry Clay	"	"		—	5 00			—
Powelton	"	"	5	50	5 00			—

[*Dealers in these coals may be found in our advertising columns.]

Prices for Coal at Mauch Chunk.

	F. L.	Bro.	Gra.	Eg.	Sto.	Cst.
Lehigh	$3 00	$3 75	$3 75	$3 75	$4 00	$3 25
Wilkesbarre	3 00	3 75	3 75	3 75	4 00	3 25

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f.o.b. at Phila.	$5 00
Lemon " " "	4 75
Cumberland Vein Coal	5 00
Cumberland C. & I. Co.'s on board N. Y.	7 00
Maryland Coal Co. " "	7 00
Consolidated Coal Co.'s " "	7 00

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port						
Pittston at Newburgh	4 30	4 50	4 50	4 60	5 10	4 20
Lackawanna at Rondout	4 75	4 85	5 00	5 25	5 60	4 75
*Wilk'b're at Hoboken	5 00	5 25	5 50	5 50	6 00	5 00
Old Co. Lehigh at Pt. Johnston	—	—	—	—	—	—
Lehigh at E. Port	5 75	5 60	5 50	5 50	5 75	5 00

For freights to different points, see "Freights."

* 25c. advance alongside.

Prices at Baltimore—August, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 30@5 50
Pittston and Plymouth, do	5 00@5 25
Shamokin Red or White Ash, do	5 50@6 00
Lykens Valley Red Ash, do	5 40@5 50
Zerba Valley	25 5-@—
By retail, all kinds per ton of 2240 lbs.	7 00@7 50
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 75@5 00
Fairmont and Clarksburg gas, f. o. b. at L. Point	5 35@5 50

Prices at George'n, D.C., & Alexandria, Va.

August, 1870.

George's Creek and Cumberland f. o. b. for shipping	$4 55

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@— —
Lykens Valley	— —@— —
Shamokin Red or White Ash	— —@— —
Trevorton and Zerba Valley	— —@— —

Prices of Gas Coals.

August, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 73 Pine st., N.Y.

Duty, $1 25, gold.	Coarse.	Slack.
Block House	$1 75 @-	75
Gowrie	1 75 @-	75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25 @1 25	
Sydney	2 25 @- 80	
Lingan	1 75 @- 80	
Little Glace Bay	1 75 @1 00	
Caledonia	1 60 @- 80	

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Coarse.	Slack Currency.
Fairmount Gas Coal Co. of N. Y.	7 50	@— —
Despard Coal Co.	$7 50	@— —
Penn.	— —	@— —
Newburg Orrel Gas	— —	@— —
West Fairmount Gas Coal	8 00	@— —

AT PHILADELPHIA.

Powelton	$7 80

Prices of Foreign Coals.

August, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	10 00@12 00
" House "	13 50@15 50
" Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel, "	18 00@20 00

Per ton 2,000 lbs. delivered

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon	$2 00
Less drawback of 80 cents on all Coal shipped east of New Brunswick and south of Cape Henry.	

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 84
C. R., N. J., Easton to Elizabethport	1 27
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 46

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 84
C. R. R., of N. J., Easton to Pt. Johnson	1 34
Shipping expenses	25
Warfage	10
Total	$2 53

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 84
Morris & Essex R. R. Easton to Hoboken	1 34
Shipping expenses	25
Warfage	10
Total	$2 53

TO SOUTH AMBOY.

L. V. R. R.	84
B. & D. R. R. / Cam. & Am. R. R.	1 14
Shipping Expenses	25
Wharfage	10
Total	$2 23

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	84
C. RR. of N. J. Easton to Elizabethport	1 27
Shipping expenses	25
Wharfage	10
Total	$2 46

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 07
" Port Carbon	1 10
" Port Clinton	1 00

TO NEW YORK.

From Schuylkill Haven	$1 70

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris " / Freight / Towing	1 10
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris "	2
Freight	
	2 40
For re-shipment	2 20
Total	$4 60

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,25
Towage	20
Total	$ 2,50

TO NEW BRUNSWICK.

Lehigh Canal,	$ 40
Delaware Division Canal,	30
Delaware and Raritan Canal,	35
Freight,	1.05
Total,	$ 2,10

For Re-shipment—30 extra for shipping, and 10 cents. drawback.

TO BOSTON.

Sydney	$— —
Lingan	— —
Cow Bay	— —
Port Caledonia	— —
Little Glace Bay	— —

Freights.—AUGUST, 1870.

TO EASTERN PORTS.	From Philadel'a.	From E. Port and Port Johnston.	From Newburg.	From Rondout.
Amesbury	$2 50	— —	$	$
Bangor	2 75	— —	1 60	
Bath	2 25	2 00	— —	
Boston	2 20	1 63	2 00	1 75
Bridgeport	1 60	1 00	1 10	1 20
Bristol	2 00	1 25	1 40	
Cambridgeport	2 50	2 00		
Derby	2 00	— —		
Dighton	1 85	— —	1 45	
East Cambridge	2 50	2 00		
Fall River	1 75	1 25	1 40	
Hackensack	1 95	1 50		
Hartford	2 75	1 35		
Jersey City	1 75	50		
Middletown	— —	1 25		
Mystic	1 75	1 25	1 30	
New Bedford	1 75	1 40		
Newburyport	2 20	2 00		
New Haven	1 70	1 00	1 10	1 20
New London	2 00	1 15	1 25	1 30
Newport	1 75	1 25	1 40	
New York	1 25	50	70	
Norwalk	1 80	1 00	1 05	
Norwich and tow	1 70	1 35	1 35	1 40
Pawtucket	2 00	1 50	1 60	
Portland	2 00	1 75		
Portsmouth, N. H.	2 15	2 25		1 85
Providence	1 85	1 40	1 45	1 45
Rockport	2 10	— —		
Saco	2 30	2 10		
Sag Harbor	2 00	1 40	1 30	
Salem	1 60	2 10		1 75
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 75	2 00		
Warren	— —	1 40	1 45	
Washington	1 10			
TO RIVER PORTS.				
Albany		90	- 60	
Catskill		— —	- 50	
Cocksackie		— —	- 50	
Coeyman's		— —	- 75	
Cold Spring		— —	- 35	
Fishkill		— —	- 30	
Haverstraw		50	- 60	
Hudson		— —	- 50	
New York		— —	- 70	
Nyack		50	- 60	
Poughkeepsie		— —	- 35	
Rhinebeck		— —	- 30	
Rondout		— —	— —	
Saugerties		— —	- 40	
Sing Sing		— —	- 75	
Stuyvesant		— —	- 55	
Tarrytown		80	- 75	
Troy		90	- 75	
West Point		— —	- 35	
Yonkers		40	- 60	

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven	$ 40
Bridgeport	40
Southport	40
Westport	40
Norwalk	40
Stamford	40
	Per Boat.
Greenwich	$70 00
Port Chester	80 00
Mamaroneck	70 00
Glen Cove	— —
New Rochelle	55 00
East Chester	60 00
West Chester	30 00
White Stone	30 00
College Point	25 00
West Farms	25 00
Flushing	30 00
Harlem and Mott Haven	20 00
Port Morris	20 00
Ninety-first street and Astoria	16 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS.

Boats of 150—250 Tons.

	Per Ton.
To Manhattanville	8 cents
Spuyten Duyvil	8 "
Yonkers	9 "
Hastings	10 "
Piermont	12 "
Dobbs' Ferry	12 "
Nyack	14 "
Tarrytown	15 "
Sing Sing	16 "
Croton Landing	17 "
Haverstraw	17 "
Verplanck's	17 "
Peekskill	18 "
West Point	20 "
Cold Spring	20 "
Newburgh	18 "
Poughkeepsie	22 "
Rondout	23 "

Boats of 100 Tons	Per Boat.
To Manhattanville, and Return,	$11 00
Spuyten Duvvil, "	13 00
Yonkers, "	15 00
Sing Sing, "	20 00
Peekskill, "	25 00

Foreign and Provincial Freights.

August, 1870.

Foreign.	
Newcastle and Ports on Tyne, per keel of 21 1-5 tons	£14 00@£16 00
Liverpool	12s.6d@14.ton

METALS.

NEW YORK, August 19, 1870.

IRON.—Duty: Bars, 1 to 1¼ cents ℔ lb: Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1½ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, 9 ℔ ton; Polished Sheet, 3 cents ℔ lb.

	Store Prices.
Pig, Scotch No. 1, ℔ ton	33 50@36 00
Pig, American, No. 1	32 00@33 —
Pig, American, No. 2	30 —@31 —
Pig, American, Forge	29 —@30 —
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	85 00@100 00

	Store Prices, Cash
Bar, Swedes, ord'y sizes, less 5 ℔ ct.	— —@110 00
Bar, Refined " "	80 —@ 85 00
Bar, Common " "	75 00@ 80 00
Scroll " "	97 50@130 —
Ovals and half-round " "	100 —@125 —
Band " "	95 —@ — —
Horse Shoe " "	95 —@ — —
Rods, ⅝ to 3-16 inch " "	85 —@120 —
Hoop " "	105 —@150 —
Nail rod, less 5 ℔ ct.	— 7 @—7½
Sheet, Russia, as to Nos. (gold)	— 11¼@—11¾
Sheet, Single, D. and T. Common	— 5 @— 6
Sheet, Galv'd. Nos. 14 to 26 10 and 12c. Nos. 27, 28, and 29, 13@14	
Rails, English (gold), ℔ ton	59 00 @60 00
Rails, American, at Works in Pa.	70 00 @71 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ ℔ or under, 2½ cents; over 7 cents and not above 11, 3 centsore ℔ : over 11 cents, 2½ cents ℔ lb, and 10 ℔ cent ad val. (St prices.)

English Cast (2d and 1st quality) ℔ lb	— 15 @— 18
English Spring (2d and 1st quality)	— 7 @— 10
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11½@— 14
English German (2d and 1st quality)	— 13 @— 15
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— — @— 18
American, Spring, do.	— 9 @— 11
American Machinery, do.	— — @— 12
American German, do.	— 9 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 30
Copper Bolts	— @— 30
Copper Braziers, 16oz. and over	— @— 30
Copper Nails	35 @— 36
Copper, Old Sheathing, &c., clean	— @— 17
Copper, Chili Pig	— @— —
Copper, American Ingot	20½@— 21⅛
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1¼ cents ℔ lb; Pipe and Sheet, 2¾ cents ℔ lb.

Galena, ℔ 100 lbs.	$— @— —
Spanish (gold)	6 32½@6 45
German, do.	6 37½@6 45
English, do.	6 37½@6 62½
Bar (net)	— —@8 00
Pipe and Sheet (net)	— —@8 00

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent. ad val.

	Gold ℔ lb.
Banca	—@37½
Straits	36½@37
English	32½@33

PLATES.

Fair to Good Brands.	*Gold.*	*Currency.*
I. C. Charcoal, ℔ box	$8 75 @9 —	$10 75 @11 —
I. C. Coke	7 50 @8 —	9 25 @ 9 75
Coke Terne	6 — @6 25	7 25 @ 7 50
Charcoal Terne	7 75 @8 —	9 50 @10 00

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ℔ 100 lb

	Gold.
Plates, Foreign	℔ 100 lbs. $6 37½@ 6 62½
Plates, Domestic	℔ lb. 08½@- 11½

REMARKS:

IRON.—The market for Scotch Pig is not very firm, the supply being quite liberal, and as there is very little disposition to purchase beyond immediate requirements, lower prices have in some instances been accepted; we notice sales of 100 tons Gartsherrie at $35; 200 do. Glengarnock, 250 do. Eglinton, ex ship, and 100 do. Summerlee, on private terms. There has been very little inquiry for American, but prices are unchanged; 350 tons Allentown and 100 do. Carbon sold on terms not made public. Rails are quiet but steady at quoted rates; 100 tons old Double-Headed sold at $40 gold. Bar from store continues quiet at $80@85 ℔ ton, the latter for ½-inch. Russia Sheet has not moved to any extent—Common Sheets are dull at our quotations.

COPPER.—Sheathing is steady and firm at our quotations. Ingot continues in active demand, and prices have advauced, the market closing very firm, with an upward tendency; sales 200,000 lbs. Baltimore at 20½c., now 20⅝@21; 100,000 lbs. Detroit, 21¼@21⅜c.; 350,000 lbs. Lake, 20½@21¼c.; 50,000 lbs. do., deliverable at the end of the month, 21¼c.; and 200,000 lbs. do., September and October (100,000 lbs. each month), 21½c. cash.

TIN.—The market for Pig is quiet, but holders are very firm in view of the late advance in England—the sales are 100 pigs Malacca at 36⅜c. cash; 8 tons English, 32½c., all gold, part of the latter 30 days; and 500 pigs Straits, on private terms—Straits is now held at 36½@37c., English, 32½@33c., and Banca about 37@37½c. gold. Plates have been rather dull, but holders are firm—the sales are 300 bxs. Charcoal Terne, at $7 87½; and 100 do., 20 by 27, $17 50, gold.

LEAD.—The demand for Foreign has been small, but prices are unchanged—50 tons prime soft German sold at $6 40, gold. Bar, Pipe and Sheet are steady at 8c. net cash.

SPELTER.—Foreign remains quiet but steady, and we have only to note sales of 10 tons Silesian at 6⅝c., and a small lot do., to arrive, 6⅞c., gold.

STEEL.—The market for lots from store continues steady at our quotations.

ZINC.—American Ox. Zinc, 6½@7c.; French do., 10⅛@10¾c.; Sheet do., 10@10½c.; Manganese, 4@4½c.

Mining Stocks.

NEW YORK, August 19, 1870.

Prices continue without material change, with sales of Grass Valley at 40c.—a slight decline; and Central at 25c.—last week's figures. The stocks that have advanced are Benton, Central, and Quartz Hill. Those that have declined are Smith & Parmelee and Grass Valley, as above mentioned. Some heretofore leading stocks are withdrawn from the list. The following is the report of the Stock Exchange:

	Bid.	*Asked.*
Bates and Baxter	15	—
Benton Gold	6	—
Black Hawk Gold	30	35
Central Gold	25	75
Consolidated Gregory	65	70
Grass Valley	40	43
Gunnell Gold	15	—
La Crosse Gold	08	—
Liberty	02	03
Mariposa	5	—
Mariposa pfd	9	—
Quartz Hill	23	—
Symond's Forks	—	75
Smith & Parmelee Gold	50	—
Quicksilver	5	6⅛
Quicksilver, pref	—	15
Walkill	03	—
Walkill assented	05	—

The following is the Stock Exchange list of prices.

	Bid.	*Asked.*
Bennehoff	20	40
Bergen Coal and Oil	40	—
Buchanan Farm	45	—
Central	59	65
Northern Light	40	1 00
Pithole Creek	—	1 40
Phillips	15	25
Rathbone	—	40
Rynd Farm	28	33
Second National	—	75
United Petroleum Farms	16	21
United States	—	80

A telegram from San Francisco, August 16, quotes stocks as follows:

Savage	33⅝	Gould & Curry	62
Yellow Jacket	33¼	Belcher	No sales.
Kentucky	38	Imperial	35
Chollar Potosi	46½	Amador	No sales.

The Slate Trade.

NEW YORK, Aug. 19, 1870.

We learn from our correspondent in Pa. that many of the quarries are at the present time running short-handed, owing to the dullness of business. Some of the quarries will suspend operations very shortly, unless a change for the better takes place in the trade. The Star Slate Co. and THOMAS W. PARRY have already stopped work for the present.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	$9 50@10 50
" green, 1st " "	9 50@10 50
" red, 1st " "	15 00@16 00
" variegated, " "	8 50@ 9 50
Pa. b'k and d'k blue, 1st qual., " "	7 00@ 8 00

SHIPMENTS OF SLATE OVER THE LEHIGH VALLEY, AND LEHIGH AND SUSQUEHANNA R. R., AND THE LEHIGH CANAL:

For the week ending August 13, 1870.

LEHIGH VALLEY R. R.

ROOFING SLATE.

Jones & Williams	245 squares.
Locke Slate Co	140 "
Hope " "	70 "
Lehigh Slate Co	70 "
Blue Mountain Slate Co	70 "
American Slate Co	35 "
Girard Slate Co	35 "
D. Williams & Co	35 "
Jones & Town	35 "
Saylor & Morgan	35 "
Total	770 "

SCHOOL SLATES.

Lehigh Slate Co	34 cases.
D. Williams	219 "
Total	253 "

BLACK BOARDS.

Yerkes & Martin	11 cases.
Lehigh Slate Co	3 "
Total	14 "

MANTELS.

Lehigh Slate Co	18 cases.
Yerkes & Martin	8 "
Total	26 "

LEHIGH CANAL.

ROOFING SLATE.

Eagle Slate Co	150 squares.

LEHIGH AND SUSQUEHANNA R. R.

ROOFING SLATE.

Twin City Slate Co	105 squares.
Eagle Slate Co	70 "
Humbach Slate Co	35 "
J. M. Coffin & Co	35 "
Philadelphia Slate Co	35 "
Total	280 "

	Week.	*Previously.*	*Total for Year.*
L. and S. R. R.	280	5,542	5,822
L. V. R. R.	770	12,390	13,160
Lehigh Canal	150	2,154	2,304
Total	1,200	20,086	21,286

Nitro-Glycerine versus Dualin.

TO THE EDITOR: Sir—Professor MOWBRAY has written a letter about dualin to the Springfield *Republican*, to which I reply as follows:

"The sample of dualin which he has examined is said to be from the factory in Neponset, which I am stated to own in partnership with Mr. BURCKHARDT, of Boston. It may be remarked just here that I am the sole owner of the factory, and have no partner whatever.

"As far as the analysis of dualin is concerned, I assert that it lacks all scientific foundation; it is an analysis for which a tyro might be pardoned, but not a scientifically educated man. With the superficial manner in which it was made, it may be possible that he found a substance having some resemblance to so-called mono-nitro-glycerine. But the whole analysis is shown to have been a weak one, by the statement that he found forty per cent. of sawdust. A composition such as the analysis develops, I have never made in my life. Mr. MOWBRAY speaks of mono and tri-nitro-glycerine. This theory is very well known to me, and probably to every one who has had any thing to do with nitro-glycerine; but to *manufacture* any other than tri-nitro-glycerine I have as yet been unable; and I hardly believe that Mr. MOWBRAY ever manufactured mono-nitro-glycerine. By his own process, by that of SHAFFNER, by mine, or by any other process heretofore in use, the final result will always be a product of the composition of tri-nitro-glycerine. The other competitor of the learned Professor, Mr. SHAFFNER, will hardly produce the material against which Mr. MOWBRAY so vehemently writes.

"The whole art in the manufacture of nitro-glycerine is to produce it as pure as possible, and the difference between the different kinds consists chiefly in this, that impure materials are used, and the nitro-glycerine has not been sufficiently cleaned. The so-called mono-nitro-glycerine, to which Mr. MOWBRAY ascribes such bad qualities, is nothing whatever but a tri-nitro-glycerine, which has received a surplus of glycerine in its manufacture, and has not been properly cleaned. Wash it with water or other solvents of glycerine and the so-called tri-nitro-glycerine will appear.

"As a matter of fact, the mono-nitro-glycerine is not the cause of the explosions in Panama, San Francisco, Wyoming Hotel, N. Y., and at Ridgefield, N. J., etc. Can it be that the learned Professor claims perhaps to have analyzed the nitro-glycerine which produced these explosions, since he testifies so decidedly about it? I hardly think so. Certainly not that which produced the explosion at Ridgefield. The latter explosion is due to entirely different causes. A part of these explosions I have described in a pamphlet, published in Germany, and have also endeavored to give the real causes. A part of these and other explosions are caused by the leaking of nitro-glycerine from the bottles or flagons in which it is packed, which was then absorbed by the packing originally used to surround these (sawdust) and self-evidently decomposed with this. Now, I am charged with being foolish enough to have manufactured a preparation from sawdust and nitro-glycerine, after I have formally proved that the foremost accidents with nitro-glycerine were caused by such a mixture.

"How little my preparations approach this analysis is to be seen in the fact that some of them are stronger than nitro-glycerine, the strongest preparation having almost twice the strength, as careful experiments by the Royal Prussian Artillery Commission have shown. It is eventually a matter of no importance if my preparation consists, if you will, of common dirt, if it only has the properties which I ascribe to it. Its great power has unhappily been shown by the accident at Worcester; and I shall now prove by public experiments, on a large scale, that this accident did not originate in the dualin, and that, with great power, it is yet the safest material of the kind ever manufactured. As every misfortune teaches a lesson, I am instructed by this, and I hope to perfect a mode of packing dualin which, without confining the dualin too tightly, will yet be of such a nature that an explosion of 1,000 exploders cannot explode the dualin contained in the packages, and so similar accidents will be avoided.

"The reference to the failures at the Hoosac tunnel is perhaps best met by the fact that the shipment which unhappily exploded was ordered by the Messrs. SHANDLEY & Co. The second shipment gave full satisfaction, when used, so that the third shipment of the same strength was ordered.

"The alleged total failure at the Hoosac tunnel is also refuted by a dispatch to me about six weeks since, by the agents sent by me, stating that twenty-three pounds of dualin had accomplished the same result as forty pounds of nitro-glycerine. The dualin then used was No. 5, the nitro-glycerine being that made by Mr. MOWBRAY.

"As far as the price of dualin is concerned, the same is, of course, materially reduced in larger orders and contracts; but even with the higher prices, the pecuniary advantage, as compared with nitro-glycerine, is soon discovered. The erroneousness of the statements in regard to the failures at the Hoosac tunnel is further attested by Mr. W. SHANDLEY, who, notwithstanding the accident, is not in the least afraid of dualin.

"I shall still have to fight many a battle before nitro-glycerine is superseded; but it makes no difference. I hope I shall not lose my patient endurance, and I shall not be led astray by such spiteful attacks, which are the expression of fear. Even should Mr. MOWBRAY's analysis discover still further disgrace in dualin, I hope it will not suffer much thereby; his repeated attacks show too plainly the motive underlying them, for the first ebullitions in the Springfield *Daily Republican* were probably from the same pen.

"I do not, however, comprehend this last attack, since Mr. MOWBRAY, only a very short time ago, had the desire to enter into partnership with me in my factory at Neponset. The proposed terms for this partnership, written by Mr. MOWBRAY's own hand, are in my possession.

"Can it be that the Professor's feelings are enlisted against me because, like himself, I have in the meantime taken pains to obtain as many contracts and orders as possible? The last attack is then explained.

CARL DITTMAR.

"P. S.—Due notice will be given in the newspapers of the time and place of the public experiments to show the perfect safety of dualin."
—*Boston Journal.*

Coal Excursion.

The following account of the recent excursion of the Coal Trade to Mauch Chunk we clip from the *Times* of the 17th:

MAUCH CHUNK, Pa.,
Saturday, Aug. 13, 1870.

On the 12th inst., in pursuance of an invitation tendered to the chief clerks of the various coal houses in the city and their friends, through Mr. ALFRED WILDER, a party of some forty ladies and gentlemen left New York to enjoy an excursion among the extensive mines in the vicinity of Mauch Chunk, Pa.

Through the courtesy of E. W. CLARK, Esq., a special car was furnished, and every attention conferred which could contribute to the entertainment of the party. After a glorious ride of about five hours, through that sublime continuation of mountain scenery so familiar to every American traveller, we arrived at Mauch Chunk, and were landed immediately in front of the Mansion House. Our arrival was anticipated by a number of the citizens, who were assembled to give us a cordial reception, and the host, Mr. BOOTH, had made ample arrangements for our entertainment; and the hop, which took place in the evening, proved a most enjoyable entertainment, and was prolonged until a late hour. Among those present we recognized Messrs. BRODHEAD, BELFORD, ESSER and other gentlemen, with their ladies, who contributed much to our entertainment by their genial company and courteous attention.

VISIT TO A MINE.

Our party were up betimes next morning, fully prepared, with shawls and water-proofs, for the projected visit to the mines. The kindness of Mr. STEARNS secured for our accommodation a special train of four cars, which, on this route, are necessarily small, and carry only twelve persons each. Immediately on starting, we commenced ascending the plain of Pisgah, in length about half a mile, with a grade having an ascent of one foot to every four. This plain is not the longest of the series, but has the greatest elevation. In order to render accidents impossible, a safety car is attached to the rear of the train. This is very heavy, and an arm reaching from its side works in a ratchet-rail. Should any accident occur to the machinery, the train can do nothing but stand still. The motive power is supplied by two engines, at the top of each ascent, of one hundred and twenty horse-power each, and having a stroke of four and one-half feet. The train is drawn up by steel bands, of about eight inches in width, which wind around large drums in the engine-room. There are two double tracks, and a safety-car on each; as one goes up the other descends to be ready for the next load. The scenery from the top of Pisgah is magnificent. In the south-east appears the Lehigh Water Gap, and, still beyond it, Schooley's Mountains are plainly visible. Right at our feet lies the Lehigh river, and the compact little town of Mauch Chunk, hemmed in on all sides by precipitous mountains. We now proceed by gravity alone, and sometimes at a high rate of speed, making stoppages only at the foot of each plain, and in due time we arrive at Mine No. 7, which had been selected as the chief point of interest for our visit.

A LONG TUNNEL.

At this mine the company are engaged in the gigantic operation of tunnelling Broad mountain, in order to facilitate the transportation of coal to the Nesquehoning Valley Railroad, thence to be transported to Mauch Chunk, and by these routes to market. The tunnelling process has already progressed since last May to the distance of about half a mile, leaving about 1,400 feet yet to be finished. The average weekly progress is about twenty-five feet, and its completion will be the signal for the abandonment of the switch-back railroad. Every possible attention was here shown us by Mr. STEELE, the gentlemanly superintendent of the works. Four cars were made ready, and an immense pile of oil-skin coats brought in, for the accommodation of our party. Our equipment completed with the peculiar miner's lamp, we went in, drawn by two mules. The atmosphere of the tunnel was delightfully cool, but we were copiously deluged by water dripping from the roof of the tunnel. Arriving at our halting-place, the whole party struck up "America," in truly loyal style, our whole surroundings rendering the selection singularly appropriate. On coming out, we took the old mule-path back to Mauch Chunk, and made exceedingly quick time on this part of the road, the grade descending very gradually, and the bed of the road being very straight. At 4:20 P. M. our party left for New York, where we safely arrived, after a most delightful and instructive excursion to that region of the country which supplies the largest portion of this Western World with its chief article of fuel.

D. J. G.

Experiments for Making Brick Masonry Impervious to Water.

Abstract of a Paper read before the American Society of Civil Engineers, May 4, 1870, by WILLIAM L. DEARBORN, Civil Engineer, Member of the Society :

THE face walls of the back bays of the gate-houses of the new Croton Reservoir, located north of Eighty-sixth street, in Central Park, were built of the best quality of hard-burned brick, laid in mortar composed of hydraulic cement of New York, and sand, mixed in the proportion of one measure of cement to two of sand. The space between the walls is 4 feet, and was filled with concrete. These face-walls were laid up with great care, and every precaution was taken to have the joints well filled and insure good work. They are 12 inches thick and 40 feet high, and the bays, when full, generally have 36 feet of water in them.

When the reservoir was first filled, and the water was let into the gate houses, it was found to filter through these walls to a considerable amount. As soon as this was discovered, the water was drawn out of the bays, with the intention of attempting to remedy or prevent this infiltration. After carefully considering several modes of accomplishing the object desired, I came to the conclusion that the mode known in England as "Sylvester's Process for Repelling Moisture from External Walls," was the easiest of application, and would be as effectual as any ; and, on consulting Dr. CHILTON, the chemist, I was confirmed in this opinion.

The results of the investigation were then submitted to A. W. CRAVEN, Engineer of the Croton Water Works, for his decision, and his instructions were to adopt Sylvester's process. This process consists in using two washes or solutions for covering the surface of brick walls ; one composed of castile soap and water, and one of alum and water. The proportions are : three-quarters of a pound of soap to one gallon of water, and half a pound of alum to four gallons of water, both substances to be perfectly dissolved in the water before being used. The walls should be perfectly clean and dry, and the temperature of the air should not be below 50 degrees Fahrenheit, when the compositions are applied.

The first or soap wash should be laid on, when at boiling heat, with a flat brush, taking care not to form a froth on the brickwork. This wash should remain twenty-four hours, so as to become dry and hard before the second or alum wash is applied, which should be applied in the same manner as the first. The temperature of this wash, when applied, may be 60 or 70 degrees, and it should also remain twenty-four hours before a second coat of the soap wash is applied, and these coats are to be repeated alternately until the walls are made impervious to water.

The alum and soap thus combined form an insoluble compound, filling the pores of the masonry and entirely preventing the water from penetrating the walls.

Before applying these compositions to the walls of the Bays, some experiments were made to test the absorption of water by bricks under pressure, after being covered with these washes, in order to determine how many coats the walls would require to render them impervious to water. To do this, a strong wooden box was made, put together with screws, large enough to hold two bricks, and on the top was inserted an inch pipe, forty feet long.

In this box we placed two bricks, after being made perfectly dry, and then covered with a coat of each of the washes, as before directed, and weighed. They were then subjected to the pressure of a column of water 40 feet high, and, after remaining a sufficient length of time, they were taken out and weighed again to ascertain the amount of water they had absorbed.

The bricks were then dried, and again coated with the washes and weighed, and then subjected to pressure as before ; and this operation was repeated until the bricks were found not to absorb any water. Four coatings rendered the bricks impenetrable under the pressure used. The mean weight of the bricks (dry), before being coated, was 3⅞ lbs. ; the mean absorption was one-half pound of water. An hydrometer was used in testing the solutions.

As this experiment was made in the fall and winter (1863), after the temporary roofs were put on to the Gate-house, artificial heat had to be resorted to to dry the walls and keep the air at a proper temperature. The cost was 10.06 cts. per square foot. As soon as the last coat had become hard, the water was let into the Bays, and the walls were found to be perfectly impervious to water, and they still remain so.

BRICK ARCH (FOOTWAY OF HIGH BRIDGE).

The brick arch of the footway of High Bridge is the arc of a circle 26 feet 6 inches radius, and is 12 inches thick ; the width on top is 17 feet, and the length covered was 1,381 feet. The arch, for 8 inches in thickness, rests on cast-iron skewbacks, which are prevented from separating by wrought-iron tie-rods. The two first courses of brick of the arch are composed of the best hard-burnt brick, laid edgewise in mortar composed of one part, by measure, of hydraulic cement of New York, and two parts of sand.

The top of these bricks, and the inside of the granite coping, against which the two top courses of brick rest, was, when they were perfectly dry, covered with a coat of asphalt one-half an inch thick, laid on when the asphalt was heated to a temperature of from 360 to 518 degrees, Fahrenheit. On top of this was laid a course of brick, flatwise, dipped in asphalt, and laid when the asphalt was hot, and the joints were run full of hot asphalt. On top of this a course of pressed brick was laid, flatwise, in hydraulic cement mortar, forming the paving and floor of the Bridge. This asphalt was the Trinidad variety, and was mixed with 10 per cent., by measure, of coal tar, and 25 per cent of sand. A few experiments for testing the strength of this asphalt, when used to cement bricks together, were made, and two of them are given below.

Six bricks pressed together, flatwise, with asphalt joints were after laying six months, broken. The distance between the supports was 12 inches ; breaking weight, 900 lbs. ; area of single joint, 28½ square inches. The asphalt adhered so strongly to the brick as to tear away the surface in many places. Two bricks pressed together, end to end, cemented with asphalt, were, after laying six months, broken. The distance between the supports was 10 inches ; area of joint, 8¼ square inches ; breaking weight, 150 lbs. The area of the Bridge covered with asphalted brick was 23,065 square feet. There was used 94,200 lbs. of asphalt, 33 barrels of coal tar, 10 cubic yards of sand, 93,800 bricks.

The time occupied was 106 days of masons and 148 days of laborers. Two masons and two laborers will melt and spread, of the first coat, 1,650 square feet per day. The total cost of this coat was 5.25 cents per square foot, exclusive of duty on asphalt. There were three grooves, 2 inches wide by 4 inches deep, made entirely across the brick arch, and immediately under the first coat of asphalt, dividing the arch into four equal parts. These grooves were filled with elastic paint cement. This arrangement was intended to guard against the evil effects of the contraction of the arch in winter, as it was expected to yield slightly at these points and at no other point, and then the elastic cement would prevent any leakage there. The entire experiment has proved a very successful one, and the arch has remained perfectly tight.

NOTE BY GEN. GEORGE S. GREENE.

In proposing the above plan for working the asphalt with the brick work, the object was to avoid depending on a large continued surface of asphalt, as is usual in covering arches, which very frequently cracks from the greater contraction of the asphalt than that of the masonry with which it is in contact, the extent of the asphalt on this work being only about one-quarter of an inch to each brick. This is deemed to be an essential element in the success of the impervious covering.—*Van Nostrand's Engineering Magazine.*

Iron in Missouri.

Extract from the Address of R. S. ELLIOTT, of St Louis, before the Board of Agriculture and Members of the House of Representatives, at Jefferson City, Mo.

IN greater or less abundance, the metallic resources of Missouri are diffused over an area of more than twenty thousand square miles. In this vast domain there are hundreds of localities giving such promise as to justify enterprise in searching out their treasures ; and there are many spots of unrivalled richness. Iron, the most essential of all, and which enters into the uses of the cabin or the palace, is the leading metal of Missouri. Though yielding in past years to lead, in the values produced, it will yet in the future surpass all the other metallic products of the State. The iron mines of Missouri not only contain ores in unexampled quantities, but their ores are even more remarkable for quality than abundance. It is a fact, as gratifying as it is peculiar, that all the more valuable ores of iron known in the world are found in Missouri, and of purity not excelled. In regard to the quantity of our iron ores it is idle to submit figures. They are simply inexhaustible. The Iron Mountain and Pilot Knob are known as the grandest iron features of the continent. But even leaving these wonderful masses of metal entirely out of view, Missouri has mines of iron to last not only herself, but the whole Union, for many generations. So grandly do the Mountain and the Knob loom up, that the lesser objects are almost overlooked ; yet in any other State or country they would be held in very high estimation. They are only small in comparison with the two greatest mines of the world. And it is a fact worthy of note, that all the principal iron deposits of Missouri are alike in containing the richest and purest varieties of ores ever known. There are now seven furnaces in the State smelting iron ores with charcoal. The iron produced is of superior excellence, and for some purposes unequalled. Owing to the richness and purity of Missouri ores, charcoal furnaces in the State have yielded from eighteen to twenty tons of pig metal a day for weeks in succession. This yield has never been equalled by any other charcoal furnaces in any other part of the world. Employment and support are given, directly and indirectly, by the furnaces already in existence, to a very considerable population. If their products were wrought up here at home, as they ought to be, into all the various forms assumed by the iron before it comes to actual use by the consumer, the number of people supported by this interest, working only the products of our present furnaces, would be indefinitely multiplied.

The production of iron is but begun in Missouri. Only a few years ago the Mountain and the Knob were but geological curiosities. It is only a short time since they have been reached by railroad, or since another railroad has been built near to the Moselle and the Maramec Works ; and of this brief period four years were the fevered season of tumult and war. A beginning is now only being made in smelting our iron ores with mineral coal. As the germ in the acorn is to the oak of centuries, so are the timid essays in this new industry to the operations and results, alike stupendous, which the early future will witness. Heretofore dependent on charcoal, the production of iron in Missouri has been limited, because but a limited supply of that fuel was attainable. But hereafter, using mineral coal, there need be no limit to production. The experiment of reducing Missouri ores with mineral coal is entirely successful. In Indiana, ores from Missouri, smelted with Indiana coal, yield iron of excellent quality, either for the foundry or forge. Equal success is expected at Carondelet and other localities, with Illinois coal. On the subject of reducing our ores with Western mineral coal, there is not the shadow of doubt in the minds of practical iron men. But only those who know what developments of other industries have attended the making of iron with mineral coal, in other parts of the world, can appreciate the significance of the steps now being taken and the important results to follow. Coal and iron are of far more value to England than all the gold of Australia is to that colony. The annual value of coal and iron in Pennsylvania is much greater than of gold in California. And whether we have gold mines in Missouri is a question of little consequence ; for so long as we have our iron ores, with coal accessible in like unlimited quantities, we may command the gold of others.—*Bulletin of the American Iron and Steel Association.*

Petroleum in India.

OUR countryman, Mr. B. S. LYMAN, the skilful geologist sent out at the requisition of the British government to explore the petroleum deposits of India, writes interesting private letters, which we do not feel ourselves at liberty to publish entire, from that part of the Punjaub bordering on the mountains of Persia. This is the region from which wonderful accounts of oil have recently been received ; accounts which geologists could not accept with any confidence, because the rocks of that part of the world are of much more recent date than those of our oil-bearing districts. They are of cretaceous and tertiary age, and the oil seems to be held by the same formation as that of the petroleum belt of Italy, which lies along the north and east foot of the Appenines, stretching from the vicinity of Pavia, in the valley of the Po, in the vicinity of Bari and Brindizi, on the Adriatic. The Italian wells have been sunk many years, and never yielded more than a few gallons per day.

Mr. LYMAN reached Calcutta in February, and after many delays received his equipment of tents, servants, borers and camels, on the Indus. His last letter is dated Camp Ulgud Ravine, near Esa Khel, Western Punjaub, May 5. He writes : "The oil places are all quite separate from each other, in the Punjaub, sometimes scores of miles apart, so that each has to be studied by itself." He has made separate topographical maps of a number of these localities, with sections and descriptions of the surrounding geology.

"The deposits are of a very limited extent, from a few feet to a few score yards, at most ; and beyond that limit the oil-bearing bed of its outcrop is often seen to be quite free from oil. The dips are generally steep, seldom less than 45°. Scarcely any two of the oil springs seem to come from the same bed of the rock ; although most of them seem to be in the nummulitic formation. The one at this place is larger than any I have yet seen, and is exposed for several hundred yards ; perhaps under cover it extends still further. It has been thought to be in the carboniferous. The oil, or rather the tar, oozes from bituminous spots in a sand rock, some fifty feet thick ; also from similar spots in a very coarse conglomerate (with pebbles as large as one's head), nearly as thick, above it ; dip only about 25°."

Borings have been commenced at Gunda, twenty-seven miles west of the town of Rawul Pindee, whose gas works need petroleum. Last year a well thirty-five feet deep was sunk at Gunda and yielded five or six gallons per day, the best yield yet made in the Punjaub. Subsequent borings have not increased it. The dip of the rocks here is about 60°. Mr. LYMAN was directing the sinking of a test well which was going down at the date of his last letter, the boring being done by an English sergeant of the Corps of Sappers and Miners, an intelligent man, and some Sepoy and Coolie assistants.

Mr. LYMAN had half a dozen other reported petroleum localities to examine before the rains and heats set in, which stop all work in the low lands. The thermometer already stood at 101° in the shade. He is to make a thorough exploration also of the Assam and of the Burma oil region.—*American Engineer.*

The Philadelphia Water Works—Their Present Condition.

SINCE last summer, a number of improvements have been made in the Philadelphia Water Works, which will increase the supply of water to certain portions of the city. The new Cornish engine, at the Schuylkill Works, which was put in operation early this year, is now pumping about 8,000,000 gallons per day. This engine, with the others in use at these works, pump about 18,000,000 gallons per day, an increase of 7,000,000 per day, as compared with the period of drouth last summer. A larger engine of the same pattern, which will be capable of pumping about 10,000,000 gallons per day, is now under way, and will be completed next March. At the Fairmount Works, the second large turbine wheel built in the place of the old breast wheels is completed, and now pumping about 8,000,000 gallons per day. A contract was made some time since for the third turbine wheel, and the work has been commenced, but will not be completed until next year. When this work is finished but two of the old breast wheels will remain. One section of the new reservoir at Belmont, to supply West Philadelphia, has been completed, and in a few days will be filled with water, the new engine at the new works, near Belmont Cottage, having been finished. The capacity of this engine and pump is 5,000,000 gallons per day. As soon as the second engine for these works is built and put in place, the old engine house near Girard avenue will be abandoned. In about six weeks it is expected the repairs to the reservoir at Roxborough will be completed, and also the bridge over the Wissahickon, which is to convey the water for the supply of Germantown. This bridge, which is formed of two lines of 20 inch water main, will be 584 feet long, divided into four spans, the highest pier 94½ feet high, and made of wrought-iron pipes eight inches in diameter, and braced with wrought-iron ties. The water pipe on each side of the creek has already been laid, and as soon as the bridge is completed water will be supplied to the reservoir at Mount Airy from the Roxborough reservoir. There are two engines with a pumping capacity of 6,000,000 gallons per day at the Delaware works. A new engine, with the capacity equal to the two old ones is now being constructed, and a new reservoir built at Sixth street and Lehigh avenue. The engine and reservoir will be completed next summer.—*American Engineer.*

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor.

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Full particulars given without charge on application.

Admiral Farragut

IT is but a few weeks since we chronicled the death of the illustrious confreré of the subject of the present notice, Admiral DAHLGREN. Admiral FARRAGUT, whose death at the Portsmouth Navy Yard on the 14th of August, is recorded in the daily press, was certainly not excelled in personal bravery, coolness and good judgment in action by any officer of our Navy. Though less known for scientific acquirements than Admiral DAHLGREN, his reputation as a commander had placed him at the head of our Navy. At the time of his death he was sixty-nine years of age, having been born on the 5th of July, 1801, and having served twenty-five years in active sea service and eighteen on land. Beginning his naval career as a mere boy he had distinguished himself for bravery before he had reached a dozen years. The brilliancy of his exploits below New Orleans; his passing the rebel batteries below Vicksburg and blockading the mouth of the Red River, an important channel of supplies for Vicksburg; and later in August, 1864, his operations in Mobile bay and the famous fight with the rebel iron-clad steam-ram Tennessee, which the Admiral directed from the rigging of his flag-ship, the Hartford, where he had lashed himself to prevent being thrown off by the collisions between the vessels, are still fresh in the memory of the American people. No one can hear of the death of such an old veteran without a feeling of sadness, that the country has lost so brave and able an officer, and the officers of the Navy the daily presence among them, of so excellent a model.

New Publications.

THE AMERICAN CHEMIST: A Monthly Journal of Theoretical, Analytical, and Technical Chemistry.

THE American reprint of the *Chemical News* having ceased to be published, its place in our scientific literature is more than filled by the appearance of this new and original monthly, under the editorial charge of Professor C. F. CHANDLER and his brother, Mr. W. H. CHANDLER. Considerable matter is extracted for its columns from the *Chemical News*, owing, we believe, to the circumstance that the subscription list of the deceased periodical is transferred to its successor, and the subscribers have, therefore, some right to expect the reproduction of the most valuable articles in the English chemical journal referred to. There is already, however, a large amount of interesting original matter. We notice Professor CHANDLER'S report to the Board of Health, on "The Milk of the Metropolis." The conclusion of this able paper is as follows:

"This investigation establishes the fact that the citizens of the Metropolitan District are generally receiving milk which is free from injurious adulterations, and untainted with disease. Nevertheless, a fraud is perpetrated upon them in the systematic dilution of the milk with water. The average percentage of pure milk in the adulterated article with which the city is supplied is 73.28; or, in other words, for every three quarts of pure milk there is added one quart of water. It was stated at the Convention of Milk Producers and Dealers, held at Croton Falls, in March, 1870, that the total amount of milk supplied to the cities of New York and Brooklyn from the surrounding country, was about 120,000,000 quarts per annum. To reduce this to the quality of our city supply, requires an addition of 40,000,000 quarts of water, which, at ten cents per quart, costs us the snug sum of $4,000,000 annually, or about $12,000 per day."

ELEMENTS OF SURVEYING AND LEVELING: With descriptions of Instruments and the necessary Tables. By CHARLES DAVIES. LL.D., author of "A Full Course of Methematics." A. S. BARNES & Co., New York and Chicago. 1870.

The works of this author, for years Professor of Mathematics at the Military Academy at West Point, and later, till within a few years, Professor of Higher Mathematics at Columbia College in this city, are too familiar to all engineers to need even a word of commendation from us. Each former edition has differed more or less from the one which preceded it, and now we have given the most recent and most approved methods of laying out railroad curves, section leveling for excavation and embankment, and an article on "Mining Surveying." The greatest fault to be found with the latter is its brevity. Many details, necessary to the complete survey of a mine, are omitted entirely, but what there is, is good, and we are glad to see it in the new edition of the "Surveying," and hope for better things in future editions. We are told in the preface that we are indebted for the article to Professor PECK, whose experience as instructor in this branch must have been sufficient to supply a more voluminous article, had it been deemed advisable.

Meeting of the American Association.

EDITORIAL CORRESPONDENCE.

TROY, Aug. 17, 1870.

THE eighteenth meeting of the Association opens under the the most delightful auspices. The weather, which has been horribly hot in Troy for a month past, is now charmingly bright and breezy; the citizens are hospitable and cordial to the last degree; and the members of the Association have turned out in force. The opening exercises this morning were interesting and gracefully conducted. Hon. JOHN A. GRISWOLD introduced the Association to the Mayor of the city in a very neat little address, in which the claims of Troy as a city where science is taught, honored, and usefully applied, were eloquently alluded to. The Mayor's speech of welcome followed, and these pretty preliminaries were concluded by a brief but exceedingly happy address from STERRY HUNT, the Vice-President of the Association. The venerable President, WILLIAM CHAUVENET, of St. Louis, is not present. Indeed, the appointment was bestowed upon him last year rather as a deserved testimony to his fame as an astronomer and physicist than in any expectation that his age and failing health would permit him to discharge the active duties of the position. Dr. HUNT is therefore acting as President, and performs the functions, as he wears the honors, with dignity and quiet ease.

The city has placed at the disposal of the Local Committee the several rooms of the court-house on Second street; the first Presbyterian Church, their church and vestry on First street; and J. H. WILLARD, Esq., the large hall of the Willard Female Seminary, thus furnishing convenient and commodious rooms for the meetings of the General Session, the several sections, and the various committees. The Local Committee are in attendance at their room in the court-house. Members, and those who wish to become members, enter their names, professions, residences, and routes of travel with the Local Secretary immediately on arrival. They are then furnished with tickets, which they must present to members of the Reception Committee in order to be assigned to their lodgings. The public generally are invited to attend the general and sectional meetings. There is an Association Post-office for the distribution and reception of letters, and other matters by the mail, at the office of the Local Committee. The Troy papers, containing the reports of the meetings, are for sale, in wrapper, and out, at the Association Post-office.

You will see that the arrangements for the comfort of the Association are as complete as good sense and good will together could make them. The choice of Troy for the meeting is amply justified by this cordial and thorough welcome on the part of the citizens. But the attractions of the place in the way of sight-seeing are also great, as the following list of a few of the places of interest in Troy and its vicinity will show: The proprietors of the Burden Iron-works, Albany Iron-works, Rensselaer Iron-works, and Bessemer Steel-works, extend to the members of the American Association for the Advancement of Science, an invitation to examine their works and processes. Many of the operations at these works, especially the Bessemer process, are very brilliant at night. The United States Arsenal at West Troy, General P. V. HAGNER, commanding—the largest arsenal in the country; the Rensselaer Polytechnic Institute, its library, halls, cabinets, etc.; the privileges of the library and reading-rooms of the Young Men's Association, in the Post-office building, are extended to all members of the Scientific Association during their stay in the city; the bell foundries of Messrs. MENEELY'S SONS, West Troy, and also Messrs, JONES & Co., of Troy; the extensive car factory of Messrs. GILBERT, BUSH & Co., on Green Island; the oil-cloth factories of Messrs. POWER, in Lansingburgh; the various stove foundries of Troy—some of the most extensive in the world; the Harmony Mills of Cohoes, near which the remains of the mastodon, now in the Museum at Albany, were found—the Falls of the Mohawk, near by, are among the largest and most beautiful of the State; the Natural History rooms, State Library, Observatory, etc., at Albany, will be visited during the excursion to that city.

The proceedings this afternoon have been quite interesting. In Section A—Physics, Chemistry, and Mathematics—(President BARNARD, of Columbia, in the Chair), a paper by Professor WINCHELL, of Michigan, on "The Isothermal Lines of the Lake Region," called forth some discussion. He exhibited charts, showing the isothermel lines for different seasons, and explaining, more clearly than it has heretofore been done, the effect of the great lakes upon climate.

Section A (Geology and Natural History—Professor GRAY, of Cambridge, Chairman,) has been the scene of some able talking from Professor E. S. MORSE and E. D COPE, on palæontological subjects.

This is all that I can find time to report to-night, and with this you must be satisfied for the present. By the next issue of the JOURNAL, the whole meeting of the Association will be a thing of the past, and we shall be able to estimate its success and influence. All that can now be said, is that it begins most auspiciously.

R. W. R.

Electrical Motor for Sewing and Other Machines.

A FEW days since, at the works of the Woodward Steam Pump Manufacturing Company in this city, we saw a small electrical machine used for driving sewing-machines and furnishing power sufficient for any light labor.

The machine is a modified form of that exhibited last year at the Fair of the American Institute. It consists of a series of electric magnets arranged around a fixed centre; outside of these revolves a series of armatures, coming nearly in contact with them. When in operation, each magnet is attracting while the armature is approaching it, but as soon as the point of greatest attraction is reached the current is interrupted until the next armature approaches within the reach of its influence, when the current is again allowed to flow. This going on all round at each of the magnets gives the wheel a considerable force. The machine suitable for driving sewing-machines is about six inches long, and six or eight in diameter. This machine requires a battery of four cups to give power sufficient to drive an ordinary sewing-machine. Another application of this little engine is to the driving of a fan for cooling a room or a portion of it. It keeps up a very brisk breeze, and would be a great comfort in weather as warm as that which we have been having this season.

The next size larger than this can be used for pumping water, and would probably produce the same amount of work as a man. The patentee is Mr. GAUMÉ. As these machines are in successful operation, the next question was to ascertain the cost and expenses of running.

The first cost of a machine and battery suitable for sewing machines will probably be about $25. The zinc used in the battery costs 8 cents per pound, the acid 2½ cents per pound. It takes, in all, to charge the battery of four cups, about 9 cents' worth of the materials; this will last for two days, as machines are ordinarily run, or about six hours' steady work. The zinc does not require renewal for a considerable time, and, when it does, will not cost more than 50 cents. Such are the facts as given to us by the inventor. As far as we could see, the working of the machines were all that could be desired.

American Iron and Steel Association.

MAJOR MCALLISTER, the able Secretary of this excellent institution, is putting its annual report through the press in the usual pamphlet form. He permits us to use the following statistics in advance of its appearance:

BLAST FURNACE STATISTICS.

The development of the pig iron manufacture that was noticed at length in our report for the years 1866, 1867 and 1868, continued with increased vigor during the year 1869. The remarkable growth of this branch of business during the past few years has, by no means, been confined to the older iron regions, from which, until recently, the principal supply of iron for the whole country has been drawn. Localities that have long been known as admirably adapted to the manufacture of iron, but which it has been supposed would not be called upon to yield their stores of mineral wealth for years to come, have suddenly loomed up into importance. Several States that five years ago were compelled to purchase every pound of pig iron for consumption, now produce many thousands of tons annually. For some years prior to 1860, Indiana produced a small quantity of charcoal pig iron, about 1,000 tons per annum. From that time until 1867 no pig iron of any kind was made in the State. In 1867 a large bituminous coal furnace, with a capacity of 9,000* tons per annum, and employing a capital of $150,000,

was erected at Brazil, Clay county. In the following year two furnaces were built, with a capacity of 7,500 tons each, with a capital of $200,000. The same year another furnace was built in Clay county, with a capacity of 3,600 tons, and employing a capital of $100,000.

Last year a fifth furnace was blown in the same locality, having a capacity of 3,600 tons and a capital of $125,000. A sixth furnace, at Terre Haute, has just been completed, having a capacity of 7,500 tons, and employing a capital of $150,000. These furnaces produced, in 1869, about 23,500 net tons of iron. Their united capacities are 35,000 tons per annum, and a capital of $725,000 is employed in their operation. Four additional furnaces would have been erected during the course of the present year but for fear of legislation adverse to the iron interest. In Illinois, prior to 1859, a few hundred tons of pig iron was made annually. From that time to the beginning of last year there was not an active furnace in the State. Within the past eighteen months, however, the business has received a new impetus. Six large stone coal furnaces have been erected; four of these are in the vicinity of Chicago, and two at Grand Tower, in Jackson county, on the Mississippi river. We hear of a seventh in course of construction, but can not now name the locality. Thus, in the short space of eighteen months, Illinois has acquired a capacity for producing from 50,000 to 60,000 tons of pig iron. A bituminous coal furnace, having a capacity of 35 tons per day, has been erected at Milwaukee, Wisconsin. Five large stone coal furnaces have been built in Missouri within the past year. That great and growing State has now a capacity of 300 tons of pig iron per day, with means for greatly increasing the production should legislation be propitious.

To show the condition of the iron manufacture in Eastern Kentucky, we can do no better than quote from a letter recently received from a gentleman living near Ashland, in that State. He says: "During the last three years, two large stone coal furnaces and two charcoal furnaces have been built near this place, all within sight of each other, on the bank of the Ohio river. Raccoon, Buffalo, Lovel, Greenup and Kenton furnaces, that were all idle during the depression before the war, have started again within three years, and, if Congress will let our tariff alone, two additional stone coal furnaces will be built near this place during the present year. The Lexington and Big Sandy Railroad is now is a fair way to be finished, opening up a vast ore and coal region, in which many new furnaces could be erected. The Kentucky Improvement Company propose to build or extend their road thirty miles, to a large deposit of ore, opening up a great charcoal section, and transporting ore to the river for sale and to smelt in furnaces which they propose to build. It is easy to see how a depression in business would effect these enterprises. The furnaces would not be completed, the roads would not be built, and the region of country, 125 miles long and 75 wide, now a wilderness, would remain as it is. Let prosperity be guaranteed to us by an adequate tariff, and what a change we would see—furnaces every few miles, giving employment to a hardy, industrious people; this whole section changed from a hunters' wilderness to the most wealthy and valuable part of the State."

In several of the Southern States, where before the war, a few hundred tons of iron only were made in forge fires, companies are being formed and capital raised for the purpose of converting their beds of coal and of pure and rich ores into the many products required by a growing diversity of interests. Many of the present most active champions of home labor came from that section of our country.

ANTHRACITE IRON STATISTICS.

In the States north and east of Pennsylvania, the production of anthracite iron in 1869 was 269,256 tons, as follows:

	TONS.
New Jersey	54,201
New York	210,855
Massachusetts	4,200

The production of anthracite iron in these States has arisen from 64,969 tons in 1864, to the quantity above given in 1869. The anthracite furnaces in the States above named were erected as follows: 1 in 1844, 2 in 1845, 3 in 1847, 2 in 1848, 3 in 1850, 3 in 1852, 3 in 1853, 4 in 1864, 1 in 1855, 2 in 1857, 2 in 1860, 3 in 1861, 1 in 1862, 3 in 1864, 2 in 1865, and 8 since 1865; eight of the whole number have been abandoned and dismantled.

The following statement shows the progress of this branch of manufacture in the States above named:

YEARS.	MASS.	NEW YORK.	NEW JERSEY.	TOTAL.
1854	4,978	35,619	24,372	64,969
1855	7,181	49,728	31,754	88,663
1856	3,855	52,826	29,247	85,928
1857	3,900	46,486	22,785	73,171
1858	2,000	49,380	16,447	68,827
1859	1,000	68,281	28,394	97,686
1860	—	79,509	27,092	106,601
1861	—	66,793	24,000	90,793
1862	—	72,702	27,500	100,202
1863	—	109,992	38,000	147,992
1864	2,509	121,863	41,000	162,863
1865	3,000	80,420	16,195	99,615
1866	3,606	118,274	40,680	162,560
1867	3,500	151,586	36,919	192,005
1868	4,000	160,681	47,209	211,890
1869	4,200	210,855	54,201	269,256

The production of anthracite pig iron in Pennsylvania in 1869 was 692,739 tons. Of this quantity, 300,916 tons was made in the Lehigh region; 150,409 tons in the Schuylkill region; 123,273 tons in the upper Susquehanna; and 118,141 tons in the lower Susquehanna. This product exceeds, by 20,784 tons, or 3.09 per cent., that of 1868; 98,469 tons, or 14 per cent. that of 1867; 118,980 tons, or 20⅔ per cent. that of 1866.

This branch of manufacture exhibits the greatest growth on the Lehigh, and the least on the Susquehanna. Within the past three years, fourteen furnaces have been erected in the first-named locality, including two or three nearly completed, increasing its capacity about 140,000 tons. The product of the older furnaces has been increased materially by new appliances, enlargements, etc. In the Schuylkill region, the average annual increase for the past six years has been 16¾ per cent. The capacity of this region may be set down at fully 180,000 tons.

The following statement shows the whole product of anthracite pig iron in Pennsylvania for the past eight years:

YEARS.	TONS.
1862	370,304
1863	433,072
1864	519,690
1865	377,433
1866	573,750
1867	594,270
1868	671,955
1869	692,730

The production in Maryland for 1869 of anthracite pig iron was 9,155 tons.

The total product of anthracite pig iron in the United States in 1869, is thus shown to be as follows:

	TONS.
Massachusetts	4,200
New York	210,855
New Jersey	54,201
Pennsylvania	692,739
Maryland	9,255
Total	971,150

The yearly product of anthracite iron for the past ten years has been as follows:

YEARS.	PRODUCTION. TONS.	INCR. OR DECR. PER CENT.
1860	519,211	
1861	409,229	decr. 21.18
1862	470,315	incr. 14.90
1863	577,638	incr. 22.82
1864	684,018	incr. 18.41
1865	479,558	decr. 29.89
1866	749,367	incr. 56.26
1867	798,638	incr. 6.57
1868	893,003	incr. 11.80
1869	971,150	incr. 8.75

RAW BITUMINOUS COAL AND COKE IRON.

The production in 1869 amounted to 553,341 tons, an increase of 213,341 tons, or 62.74 per cent. over that of 1868, and 235,694 tons, or 73.65 per cent. over that of 1867, and 284,345 tons, or 105.7 per cent. over 1866. In 1854, the production of this class of iron was 54,485 tons, since which the average annual increase has been 54½ per cent.

There was great progress made by this branch of business in several localities during the past few years; in illustration of this we will cite a few instances.

In 1864, there were eleven furnaces of this class in the Shenango valley, Pennsylvania, the oldest of which was erected in 1844. The capacity of these furnaces was about 45,000 tons annually. During the five following years, to 1869 inclusive, there were erected in that locality ten additional stone-coal furnaces, having a capacity of from 85,000 to 95,000 tons, and employing a capital of $800,000. During the same time, three charcoal furnaces were built in the valley, with a capacity of 8,000 tons, costing about $50,000. The capacity of the old furnaces has been increased fully 25 per cent. by reversion and enlargement during the past five years. In the Hanging Rock region of Ohio, five bituminous coal furnaces have been built or rebuilt within three years, increasing the capacity of that region 40,000 tons per annum. These new furnaces employ a capital in works and ore and coal lands of over one million of dollars. A similar development in the charcoal manufacture has taken place in the same locality. In the Mahoning region, in North-eastern Ohio, twelve new bituminous coal furnaces have been built within three years; four were blown in in 1867, five in 1868, and three in 1869. These new furnaces have an annual capacity of 95,000 tons, and cost $750,000. Two large bituminous furnaces have recently been erected in Michigan, one in the vicinity of Detroit, the other in the upper Peninsula—the latter, according to the latest advices, is about to be blown in. Of the growth of this branch of the pig iron manufacture in Indiana, Illinois, and Missouri, we have frequently spoken.

CHARCOAL IRON.

The production of charcoal iron in 1869 amounted to 392,150 tons, as follows:

	TONS.
New England States	38,000
New York, New Jersey, Penn'a., and Maryland	134,000
Western States	206,500
Southern States	13,650

This quantity exceeds, by 22,150 tons, or about 6 per cent., the product of 1868; 47,809 tons, or 13.88 per cent. that of 1867, and 59,570 tons, or 17.91 per cent. that of 1866.

The annual production of charcoal pig-iron in the United States for many years past has been quite variable, as the following statement will show:

YEARS.	PRODUCTION. TONS.	INCR. OR DECR. PER CENT.
1854	342,298	
1855	339,922	decr. 7.10
1856	370,470	incr. 9
1857	330,321	decr. 10½
1858	285,315	decr. 13½
1859	284,041	decr. 4.10
1860	278,331	decr. 2
1861	195,278	decr. 29
1862	186,660	decr. 4
1863	212,005	incr. 13
1864	241,753	incr. 14
1865	211,853	incr. 14
1866	332,580	incr. 26½
1867	344,341	incr. 3
1868	370,000	incr. 7
1869	392,150	incr. 5

It will thus be seen that, with the exception of a single year, there was a steady falling off in the production of charcoal iron from 1854 to 1862 inclusive, and as steady an increase from 1862 to the present time.

While but little progress has been made in this branch of manufacture in the New England and Middle States during the past three years, its growth in the West has been exceedingly gratifying.

Within that period a number of furnaces have been built in Ohio, largely increasing the capacity of that State for making this kind of iron. In Michigan six new charcoal furnaces have blown in, having a total capacity of between 30,000 and 40,000 tons. In Wisconsin a new charcoal furnace was put in blast in 1869, another has been blown in since the beginning of the present year, and a third is now in process of construction. Two new furnaces using charcoal for fuel have been built in Missouri and several in Kentucky. In the Southern States a number of old charcoal furnaces that went out of blast when the war ended, have recently been repaired and lighted. They are located as follows: One near Lincolnton, N. C., making about 1,500 tons per annum, a considerable part of which is converted into hollow ware and other light castings for local consumption. Two in Cass county, Georgia, which made, in 1869, 487 tons of charcoal iron, most of which was also made into hollow ware. Three in Alabama, which made respectively 500 tons—four, 908 tons, and one, 756 tons. The last named State is making a great effort to develop her mineral resources. The late Legislature passed an act granting aid to several important railroad companies, upon the condition that in the construction and equipment of said roads preference must be given, terms being equally favorable, "In all contracts for cross ties, rails, chairs, spikes, joint fastenings, locomotives, cars of all kinds, and other materials and equipments, to the proprietors of such foundries, mills, manufactories and other works, as are engaged in the manufacture of iron, of ores, and of other raw materials found in the limits of the State of Alabama."

TOTAL PRODUCT OF PIG IRON OF ALL KINDS IN THE UNITED STATES IN 1869.

Tons	1,916,641
As follows:	
Anthracite pig iron	971,150
Raw bituminous coal and coke pig iron	553,341
Charcoal pig iron	392,150

The product in 1865 was 931,000 tons, it having more than doubled in four years. This enormous increase in the production is due in a great measure to the operation of a protective tariff, and the noble response of this industry to the requirements of the country overthrows some of the most plausible theories of free trade.

ROLLING MILL STATISTICS.

The production of the rail mills for 1869 was as follsws:

	TONS OF 2,000 LBS.
Massachusetts	32,238
New York	79,463
Pennsylvania	319,653
Maryland	27,328
Ohio	41,837
Kentucky	7,817
Michigan	6,885
Illinois	53,261
Wisconsin	8,680
Other States	16,424
Total	593,586

The progress of this branch of manufacture during the past ten years is shown by the following table:

1860	205,038	TONS OF 2,000 LBS.		
1861	189,818	" "	Decrease.	7.4 p. ct.
1862	213,912	" "	Increase.	12.6 "
1863	175,703	" "	"	28.9 "
1864	335,369	" "	"	21.6 "
1865	356,292	" "	"	6.2 "
1866	430,778	" "	"	20.9 "
1867	462,108	" "	"	7.3 "
1868	506,714	" "	"	9.6 "
1869	593,586	" "	"	17.12 "

IMPORTATION OF RAILS.

During 1869 we imported from Great Britain 336,500 tons of rails, an increase of 36,340 tons as compared with the imports of 1868, 151,459 tons over 1867, and 216,622 tons over 1866. As we imported a few rails from other European countries, the total importation probably amounted to 345,000 tons, making with the 593,586 tons manufactured here, a total consumption of 938,586 tons. Taking into consideration the growth of our railroad system, the requirements of the country for the coming five years will doubtless average over a million tons per annum. Of the product of rails for 1869, 9,650 tons were Bessemer steel. The erection of one or two large rail mills is in contemplation, which will increase the capacity of our works beyond the total consumption of rails last year.

PRODUCT OF ROLLING MILLS OTHER THAN RAILS,

for 1869, was 642,420 tons, which may be divided about as follows:

	TONS.
Merchant bar and rod	292,500
Sheet	36,320
Plate	78,000
Hoop	17,200
Nails and spikes	146,400
Axles, and other	72,000

Of these manufactures we imported 120,795 tons; making a total consumption of rolled iron other than rails. in 1869, of 763,215 tons.

PRODUCT OF FORGES AND BLOOMARIES IN 1869

was 69,500 tons, a slight decrease as compared with the average of the past five years.

Of steel of all kinds the product was 35,230 tons, of which nearly 12,000 tons was made by the Bessemer process.

From the reports of the British Board of Trade we find that the exports of iron of all kinds to the United States, from the various British ports (which represents nearly all the foreign iron entering into consumption here), during the year 1869, was as follows:

	TONS.
Pig iron	148,383
Bar, angle, bolt and rod	62,807
Rails of all sorts	336,500
Castings	2,076
Hoop, sheet and boiler plate	37,233
Other wrought iron	9,555
Total	596,554
Steel	18,601

By comparing these figures with those of the previous year, we find that of pig iron the increase in 1869 was 54 per cent.; bar, angle, bolt and rod, 28 per cent.; railroad iron, 12 per cent.; hoops, sheet, and boiler plate 80 per cent.; other wrought iron, 71 per cent.; casting, 45 per cent. Total in-

crease iron, 26 per cent. Of steel there was a decrease of about 3 per cent.

The history of the iron ore trade of the Marquette or Lake Superior region for the year 1869 is exceedingly satisfactory. During the year, 709,387 tons of ore were mined, the value of which, when loaded in the cars at the mines, is estimated at $3,166,190. The existence of iron ore in this region was made known in the year 1830, but the first opening was not made until late in the year 1846. From that time to the end of the year 1855 only about 25,000 tons were mined. Since the latter year the trade has grown with wonderful rapidity, the total quantity mined during the 14 years that have since elapsed reaching the vast aggregate of 3,274,490 tons. From this ore over 2,000,000 tons of pig iron have been smelted, a quantity equalling the whole production of the country during the year just closed. From the excellent history of the iron mines and furnaces of the Lake Superior district, by A. P. SWINEFORD, Esq., recently published, the following statement, showing the yearly production of ore in that region since 1856, is compiled :

YEAR.	TONS OF 2,000 LBS.	YEAR.	TONS OF 2,000 LBS.
1856	7,840	1864	263,338
1857	23,520	1865	219,807
1858	34,759	1866	332,609
1859	73,560	1867	542,005
1860	130,937	1868	568,750
1861	50,882	1869	709,387
1862	129,608		
1863	267,488	Total	3,274,490

FOREIGN IRON TRADE.

A few words touching the foreign iron trade for 1869 may not be inappropriate.

In Scotland the demand for pig iron at the commencement of the year was rather inactive, the price being 55s. cash. Trade was dull during the spring, and prices after reaching 55s. 7d. cash in March to 52s. 9d., and finally near the close of May receded 50s. 7d. In June the trade improved, and prices went up again to 57s. 1½d. cash, again receding in July to 50s. 6d. From that time to the end of the year business steadily improved, the price advancing steadily until the close of the year, when it reached 57s. 3d. cash for mixed numbers f. o. b. The average price for the year was 53s. 3d. per ton, about 5s. below the average annual price for the last twenty-five years. The production during the year amounted to 1,150,000 tons, against 1,068,000 tons in 1868. At the close of the year there were 158 blast furnaces in Scotland, 129 of which were in blast. The stock of pig iron in Scotland increased during the year 52,000 tons, there being 620,000 tons in store at the beginning of the present year. The foreign shipments of pig amounted to 388,639 tons, an increase of 64,620 tons. Of this increase nearly 50,000 tons was to this country.

In the great Cleveland district, which produces about one-fourth of the whole product of pig iron in Great Britain, the iron manufacture was steadily progressive, and notwithstanding a largely increased make, the year closed with a lighter stock on hand than at the close of either of the two preceding years. The production of pig iron in this region in 1869 was 1,459,500 tons, against 1,233,400 tons in 1868, an increase of 226,100 tons. The stock on hand was reduced 37,300 tons during the year. The price of Cleveland pig No. 3 was 45s. on the first day of January, 1869, and fluctuated but little during the spring. In the summer the price fell to 43s. 6d. In September a heavy demand set in, principally from rail makers, and the price rose to 50s. 6d. cash f. o. b.

The principal vitality in the Welsh market during the year was in the manufacture of rails, for which more remunerative prices were obtained than for other kinds of iron. A brisk demand for rails for the East India, Russian and United States markets continued throughout the year.

The exportation of iron of all kinds from Great Britain for 1869 has not yet appeared. The quantity of pig iron made is estimated by the best authorities at 5,250,000 tons.

The exportation of iron of all kinds from Great Britain last year was conducted upon an immense scale.

	TONS.
Exportation of pig and puddled iron..... Against 552,999 tons the previous year.	771,612
Of bar, angle, bolt and rod..... Against 302,624 tons in 1868.	357,604
Of railroad iron the increase was marvelous.. Against 583,488 in 1868; an increase of 312,360 tons, or 53.5 per cent.	895,848

The whole of the increased activity noted was due to the heavy demands of Russia and the United States, the former taking 252,827 tons and the latter 300,446.

Castings were exported to the extent of 106,472 tons, compared with 85,504 tons in 1868; of hoops, sheets and boiler plates 195,670 tons, against 150,231 tons the previous year; of miscellaneous wrought iron 134,113 tons, as compared with 121,480 tons in 1868. The quantity of all kinds of iron exported was 2,577,493 tons, against 1,944,731 tons in 1868, an increase of 632,762 tons, or 32½ per cent.—*United States Railroad and Mining Register.*

New Process of Casting Metals.

A NUMBER of gentlemen recently met at the works of the Lancashire Engineering and Compression Casting Company, St. Helens Junction, on the Manchester and Liverpool line of railway, to witness the new process of casting, in brass and iron, chased and embossed work of the most elaborate description. The process, which was here for the first time exhibited in England, is an American invention, and its utility was shown to consist in this—that any design, whether in high or low relief, chased on metal of any required pattern or shape, whether flat as a door plate or round as a vase, can be reproduced by castings from it *ad infinitum*, and each casting will show upon it all the sharpness and beauty of the original chasing. Moulds are made with a preparation of fine clay from the articles to be reproduced. The making of one of these moulds takes a person from five to ten minutes. The moulds have then to stand twenty-four hours to air dry, after which they are baked in a furnace for eight hours. These clay moulds, into which the metal is afterwards poured, are, to all intents and purposes, encaustic tiles. These clay moulds are placed in a box, and the air is extracted from them so as to form a vacuum, after which the molten metal is forced into them, and in this way, in ten minutes, a casting can be completed. When the casting is taken out, the design, however intricate, is found to be perfectly represented, with the exception of removing a slight surface of clay from it, which can be done in half an hour, and the article is then ready to be sent to the bronzer, instead of having to be kept in the chaser's hands. In this way an enormous amount of cost and labor on ornamental articles in metal is saved.—*Colliery Guardian.*

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106,302.—LAMP-BURNER.—Benjamin F. Adams, Boston, Mass.

106,303.—LAMP-BURNER.—Benjamin Franklin Adams, Boston, Mass.

106,304.—EQUALIZING THE MAINSPRING OF TIME-PIECES.—John Peabody Adams, Ipswich, Mass.

106,305.—CUTTING APPARATUS FOR HARVESTERS.—Henry C. Aydelott, Carthage, Ind.

106,306.—HARNESS-OPERATING MECHANISM FOR LOOMS.—John Ashworth, North Andover, Mass.

106,307.—SEWING MACHINE.—Merrick M. Barnes, North Adams, Mass.

106,308.—STONE-SAWING MACHINE.—Charles Bateman, Baltimore, Md.

106,309.—TOP PLATE OF COOKING-STOVE.—Milton Bennet, Dayton, Ohio.

106,310.—CHISEL FOR CUTTING GAINS.—Hiram Bigelow, Skowhegan, Me.

106,311.—HAND CORN-HUSKER.—Samuel L. Bligh, Sandy Lake, Pa.

106,312.—STEAM PUMPING-ENGINE.—Thomas E. Blunt, Brookfield, Ohio.

106,313.—COMPOUND FOR FERTILIZER.—Gustave Bourgate, New York, N. Y.

106,314.—FOOT-MEASURE.—John Charles F. Bremser, St. Louis, Mo.

106,315.—HINGE.—John David Brown, Madisonville, Ohio.

106,316.—SPRING BED-BOTTOM.—Charles T. Baade, Brooklyn, N. Y.

106,317.—DEVICE FOR LEVELLING BILLIARD AND OTHER TABLES, &c.—Buckland W. Bull, New York, N. Y.

106,318.—TABLE.—Ernest Brucker, Old Tappan, N. J.

106,319.—MACHINE FOR MAKING MATCH SPLINTS.—Denslow Burhaus, Burlington, Iowa.

106,320, antedated July 2, 1870.—COMBINED DRILL AND SEEDING MACHINE.—John E. Buxton Owattonna, Minn.

106,321.—PADDING FOR HARNESS.—James Cormac and Alexander Stobbs, Hector, N. Y.

106,322.—MANUFACTURE OF RESIN SOAP.—Dudley B. Chapman, New London, Conn.

106,323.—TABLE-KNIFE.—Matthew Chapman, Greenfield, Mass.

106,324.—PROTECTING SAFES AND VAULTS FROM BURGLARS.—Charles T. Chester, Englewood, N. J.

106,325.—POST OFFICE CABINET FOR SUNDAY-SCHOOL AND OTHER ROOMS.—William M. Clark and Alexander Clark, Pittsburgh, Pa.

106,326.—WELL-BUCKET.—Alvens J. Clemmons, Aberdeen, Miss.

106,327, antedated August 4, 1870.—ROOFING-FELT.—William B. Coates, Philadelphia, Pa., assignor for one-half his right to Joseph Leeds, same place.

106,328.—GARTER.—Charles Coester, Jr., and James L. Moore, Bridgeport, Conn.

106,329.—STRAW-CUTTER.—Samuel Colahan, Cleveland, Ohio.

106,330.—APPROACH GATE.—Stephen H. Cole, East Enterprise, Ind.

106,331.—PADDLE-WHEEL.—Richard H. Connelly, Philadelphia, Pa.

106,332.—STRETCHER FOR PICTURE-FRAME.—John D. Crocker, Norwich, Conn.

106,333.—COMPOUND FOR CURE OF COUGHS, &c.—John Cushions, Wellington, Ohio.

106,334.—LOOM.—Hilas D. Davis, North Andover, Mass.

106,335.—SHEAVE.—Hilas D. Davis, North Andover, Mass.

106,336, antedated August 5, 1870.—HORSE HAY-RAKE.—Samuel L. Denny, Christiana, Pa.

106,337.—GUN-LOCK.—Joseph Deutz, San Antonio, Texas.

106,338.—SPRING SEAT FOR VEHICLES.—George W. Dill, Odell, Ill.

106,339.—PITMAN CONNECTION FOR HARVESTERS.—Joseph Dixon and Matthew B. Sampson, Eddyville, Iowa.

106,340.—EXTENSION-TABLE SLIDE.—William Donoghue, Philadelphia, Pa.

106,341.—HAME FOR HARNESS.—William Duncan, Spring Hill, Ind.

106,342.—HARVESTER-RAKE.—William T. Eastes, Summitville, Ind.

106,343.—INVALID CHAIR AND LOUNGE.—William T. Eastes, Summitville, Ind.

106,344.—PLOW.—Isaac Eastwood, Lanark, Ill.

106,345.—RECORDING PRESSURE GAUGE.—Jarvis B. Edson, Brooklyn, N. Y.

106,346.—INDIA-RUBBER SHOE.—Lewis Elliott, Jr., and George H. Fowler, New Haven, Conn., assignors to L. Candee & Co., same place.

106,347.—MANUFACTURE OF WROUGHT AND PUDDLED IRON.—William Ennis, Philadelphia, Pa.

106,348.—FAN-BLOWER.—John Ericsson, New York, N. Y.

106,349.—BENCH VISE.—George M. Evans, Pittsburg, Pa.

106,350.—RAISIN-SEEDER.—Henry G. Fiske, Springfield, Mass., assignor to George L. Taylor and Dwight Holland, same place.

106,351.—HINGE.—Charles Gaylord, Washington, D. C.

106,352.—OVEN.—David J. George, Arcade, Ind.

106,353.—TABLE-LEAF SUPPORTER.—George L. Gerard, New Haven, Conn.

106,354.—CULTIVATOR.—John L. Graham, Bentley Station, Ill.

106,355.—HAY-LOADER.—William H. Gray, Ashfield, Mass.

106,356.—BUCKLE WITH BUTTON-HOLE ATTACHMENT.—Benjamin J. Greely, Boston, Mass.

106,357, antedated August 4, 1870.—APPARATUS FOR RAKING AND BINDING GRAIN.—Thomas K. Griffith, Redstone, Pa.

106,358, patented in England, November 2, 1869.—STEERING APPARATUS.—Charles Godfrey Gumpel, No. 49 Leicester Square, England.

106,359.—MACHINE FOR PREPARING APPLES FOR THE MANUFACTURE OF CIDER.—George B. Hamlin, Willimantic, Conn.

106,360.—GEARING AND SELF-ADJUSTING SHAFT.—George B. Hamlin, Willimantic, Conn.

106,361.—WHEEL-HUB.—John B. Hards, Chicago, Ill.

106,362.—DOOR FOR STREET CARS.—Daniel R. Hart, St. Louis, Mo.

106,363.—LAMP-BURNER.—Hiram W. Hayden, Waterbury, Conn., assignor to Holmes, Booth & Hayden, same place.

106,364.—MACHINE FOR TURNING AXLE-TREES.—William H. Heffley, Rochester, Ind., assignor to himself and David Barb, same place.

106,365.—MANUFACTURE OF IRON AND STEEL.—James Henderson, New York, N. Y.

106,366.—MANUFACTURE OF BOOT AND SHOE SOLES.—Eugene Ibos, Paris, France.

106,367.—RAILWAY CAR-COUPLING.—John H. Johnson, Dresden, Mo.

106,368.—KEY-HOLE GUARD,—J. Hilton Jones, Binghamton, N. Y.

106,369.—EGG-CARRIER.—Edward E. Joseff, St. Louis, Mo.

106,370.—SEPARATOR ATTACHMENT TO THRESHING MACHINES.—Moses A. Keller, Littlestown, Pa.

106,371.—WATCH-MAKING TOOL.—Michael D. Kelly, Cadiz, Ky.

106,372.—DEVICE FOR WINDING MAINSPRINGS OF WATCHES.—Michael D. Kelly, Cadiz, Ky.

106,373.—AXLE-GAUGE.—Rollin C. Kelly, Brandon, Wis.

106,374.—LATH-MACHINE.—John J. Knowlton, Philadelphia, assignor to himself and William H. Burr, same place.

106,375.—FENCE-POST.—Orville L. Larkin, Otto, N. Y.

106,376.—HARROW AND CULTIVATOR.—John Lerch, Uhlersville, Pa.

106,377.—BEE-HIVE.—Volney Leonard, Springfield, Pa.

106,378.—RAILWAY CARRIAGE.—Aaron R. Locke, Boston, Mass.

106,379.—CARRIAGE-JACK.—David Marshall, Northville, Mich.

106,380.—PORTABLE GAS-PIPE VISE.—Thomas Marshall, Paterson, N. J.

106,381.—CORSET-SPRING.—Frank W. Marston, Philadelphia, Pa.

106,382.—BEDSTEAD-FASTENING.—Pres. Maulding and John U. Fraley, Marshall, Texas.

106,383.—GALVANIC BATTERY.—Edwin D. McCracken, New York, N. Y.

106,384.—PAINT-BRUSH.—Alvid McDonald and James M. White, Washington, Ill.

106,385.—HORSE HAY-RAKE.—G. M. L. McMillen, Dayton, Ohio.

106,386.—MOSQUITO-NET HOLDER.—Charles Messenger, Cleveland, Ohio.

106,387.—GUIDE FOR CIRCULAR SAW.—Alexander Middlebrook, Glasgow, Mo., assignor to himself and John B. Ruthvin.

106,388.—STEAM-GENERATOR.—Joseph A. Miller, New York, N. Y.

106,389.—CARBURETING APPARATUS.—Joseph Millward, Fayetteville, N. Y.

106,390.—TILE-CUTTING MACHINE.—Oscar F. Montfort, Dearborn, Mich.

106,391.—VENEERING PRESS.—John More, New York, N. Y.

106,392.—STEAM-GENERATOR.—David A. Morris, New York, N. Y.

106,393.—BOX.—John Nelson, Rockford, Ill.

106,394.—SELF-CLOSING COMPRESSION FAUCET.—Edward Noble, North Haven, Conn.

106,395.—FANNING-MILL.—Harrison Ogborn, Richmond, assignor to Samuel Watson, Lewisville, Ind.

106,396.—PIANO ACTION.—Charles F. Oliver, Lynn, assignor to Nathaniel Cummings, Boston, Mass.

106,397.—GROUND PULVERIZER.—Ezra A. Olleman, Mooresville, Ind.

106,398.—HAND-STAMP.—William Edwin Osborn, Brooklyn, N. Y.

106,399.—CAR-COUPLING.—William R. Patton, Des Moines, Iowa, assignor for one-half his right to Denison Tisdale, same place.

106,400.—GOVERNOR FOR STEAM-ENGINE.—Andrew J. Pevey, Boston, Mass., assignor for three-fourths of his right to George F. Pottle, same place.

106,401.—REFRIGERATOR.—Elias Perkins, Fond Du Lac, Wis.

106,402.—BOX FOR BLUING, &c.—Andrew F. Pickens, New York, N. Y.

106,403.—SCHOOL-DESK.—John F. Piehl, Richmond, Ind.

106,404.—LATHE.—Philip H. Pitts, Waverly, Mo.

106,405.—RAMROD-STOP.—Samuel W. Porter, Springfield, Mass.

106,406.—WAGON-BRAKE.—Asahel Quimby, Salem, Mass.

106,407.—COFFEE-MILL.—Francoise Charles Richer, Gilmer, Texas.

106,408.—PORTABLE IRON DERRICK.—Samuel Rider, Oil City, Pa., assignor to himself, Samuel R. Griffith, and Andrew W. Cox, same place.

106,409.—POUNCING MACHINE.—John Rosenkranz, Boston, Mass.

106,410.—STOVE-PIPE DAMPER.—William F. Rossman, Hudson, N. Y.

106,411.—FARM-GATE.—Cyrus W. Saladee, St. Catharines, Canada.

106,412.—RAILWAY-CAR BRAKE.—Elijah W. Sandford, Brooklyn, N. Y.

106,413.—PARLOR GRINDSTONE.—Josiah M. Simpson, Oshkosh, Wis.

106,414.—WASHER AND BOILER.—John Slater, Norwich, N. Y.

106,415.—TATTING-SHUTTLE.—Charles H. Smith, Brooklyn, N. Y., assignor to himself and Theodore D. Day, Bergen Point, N. J.

106,416.—CURTAIN-FIXTURE.—Rodney I. Smith, deceased, Wolcottville, Conn.; Elisha Turner, executor.

106,417.—COTTON AND HAND-PRESS.—William M. Smith, Augusta, Ga.

106,418.—ELECTRO-MAGNET.—William W. Smith, Cincinnati, Ohio.

106,419.—MACHINE FOR MAKING CHAIN-LINKS.—John H. Snyder, Troy, N. Y.

106,420.—SLIDE-CHUCK FOR LATHES.—Charles F. Stackpole, Woburn, Mass.

106,421.—CUTTER-HEAD FOR PLANING-MACHINE.—Darius Stevens, Danbury, Conn.

106,422.—DIAPER-PIN.—Isaac W. Stewart, New York, N. Y.

106,423.—RAILWAY SWITCH.—Joseph H. Stockton, Thompson, Georgia.

106,424.—WATER-PIPE MACHINE.—John W. Stockwell, Portland, Maine.

106,425.—BARBERS' FURNITURE.—Otto Stoelker, Montgomery, Alabama.

106,426.—CLASP FOR LIGHTNING-RODS.—Richard Street, Albany, New York.

106,427.—PRESS FOR HAY, COTTON, &c.—George W. Swinebroad, Bolivar, Tenn.

106,428.—BEVERAGE, OR "CHAMPAGNE MEAD."—Asher S. Taylor, San Francisco, Cal.

106,429.—GEAR FOR CARPET-SWEEPING MACHINES.—Gilbert Fisk Taylor, New York, N. Y.

106,430.—DREDGE-BOX,—Augustus F. Tripp, Buffalo, N. Y.

106,431.—SAW-FILING MACHINE.—William Tucker, Fiskedale, Mass., assignor to himself and Prince A. Snell, Pittsburg, Pa.

106,432.—REVERSIBLE CENTER PINION FOR WATCHES.—Almon Twigg, Waltham, Mass.

106,433.—PUMP.—Henry Van Keuren, Jersey City, N. J.

106,434.—RAILWAY.—Horace S. Weaver, Freeport, Pa.

106,435.—BASE-BURNING STOVE.—Albert G. Webster, Troy, N. Y., assignor to himself and George T. Scudder, same place.

106,436.—CORN-HUSKER.—Dwight F. Welsh, Bucyrus, Ohio.

106,437.—VINE-CUTTER AND TRIMMER.—Harrison W. White, Joppa Village, Mass.

106,438.—SAW-JACK.—Abel Whitlock, Danbury, Conn.

106,439.—MACHINERY FOR WORKING HIDES, SCOURING LEATHER, &c.—Theron R. Williams, Salem, assignor to Chester Guild, Jr., Boston, Mass.

106,440, antedated July 30, 1870.—PRESS FOR BAILING BROOM-CORN.—William J. Wilson, Coles county, Ill.
106,441.—ROTARY STEAM PLOW.—James T. Wilson, Rochester, New York.
106,442.—STOVE OR FURNACE-GRATE.—George A. Wing, Albany, New York.
106,443.—DITCHING PLOW.—Stephen Sidney Wood, Brooklyn, New York.
106,444.—HAY-SPREADER.—Gilbert I. Wooster, Plymouth, Conn.
106,445.—PORTABLE BATH SEAT.—Allen P. Young, Providence, R. I., assignor for one-half of his right to Albert H. Spencer, same place.
106,446.—QUILTING FRAME-HOLDER.—Nicholas Young, Parma, Mich.
106,447.—WOOD PAVEMENT.—Andy M. Adams, Washington, D. C.
106,448.—MANUFACTURE OF GLUE.—William Adamson, Philadelphia, Pa.
106,449.—MANUFACTURE OF WHEELS.—Edward A. Archibald, Methuen, Mass.
106,450.—MANUFACTURE OF POCKET-BOOKS.—James C. Arms, Northampton, Mass.
106,451.—MANUFACTURING ENVELOPES.—James Ball, New York, N. Y., assignor to himself and Samuel Raynor & Co.
106,452.—EJECTOR AND STEAM-CONDENSER.—Andrew Barclay, Kilmarnock, North Britain.
106,453.—CHURN-DASHER.—Henry F. Bartlett, La Grange, Mo.
106,454.—AUTOMATIC LUBRICATING SLEEVE.—Samuel R. Bartlett, Chicago, Ill,
106,455.—FENCE.—William Bartlett, Little Hocking, Ohio.
106,456.—MODE OF ATTACHING SLEIGH-BELLS TO STRAPS.—Wm. E Barton, East Hampton, Conn.
106,457.—COOKING APPARATUS.—Henry C. Berry, Wauseon, Ohio.
106,458.—MACHINE FOR CUTTING OFF SHAFTS AND PIPES AND FOR CUTTING SCREW-THREADS.—George Blake, Whitby, Canada.
106,459.—LAST FOR MACHINE SEWED TURNED SHOES.—Lyman R. Blake, Boston, Mass.
106,460.—DINING-TABLE.—Minor P. Boyd, Unionville, S. C.
106,461.—TOY-TOAD.—George E. Bringman, Baltimore, Md.
106,462.—BREAD-TOASTER.—Heman P. Brooks, Waterbury, Conn.
106,463.—DENTISTS' CHAIR.—Wm. M. Butler, Louisville, Ky.
106,464.—COMBINED SHOVEL AND DUNG FORK.—Jesse Carpenter, Niconza, Ind.
106,465.—PRESERVATION OF MEAT AND OTHER ARTICLES OF FOOD. Ferdinand Casselle, Cologne, Prussia.
106,466.—MACHINE FOR SPINNING FLAX, HEMP, &c.—Henry A. Chapin, Bridgeport, Conn., assignor to William Sparks Thomson, New York.
106,467.—WRENCH.—Sylvanus Chapman, Charlestown, Mass.
106,468.—BLOCK FOR CARPET PRINTING.—Thomas Crossley, Bridgeport, Conn.
106,469.—AXLE-BOX.—David Dalzell, South Egremont, Mass.
106,470.—AXLE FOR VEHICLES.—David Dalzell, South Egremont, Mass.
106,471, antedated August 4, 1870.—RAILWAY CAR-COUPLING.—Jonathan L. Devol and Atwell L. Peadro, Parkersburg, West Va.
106,472.—PERMUTATION LOCK.—Charles Diebold and Jacob Obernesser, Cincinnati, Ohio, assignors to Charles Diebold and Jacob Kienzle, same place.
106,473.—VEGETABLE KNIFE.—Fred. Durand and Wm. F. Gilbert, Derby, Conn
106,474.—MEDICAL COMPOUND FOR THE CURE OF GRAVEL.—Theodore J. Elswald, Providence, R. I.
106,475.—WRENCH.—Henry Fessler and Robert V. Jones, Canton, Ohio, assignors to themselves and John D. Graber, same place.
106,476.—BRUSH FOR CLEANING TUMBLERS.—Adolph Fischer, New York, N. Y.
106,477.—LOOM FOR WEAVING RATTAN.—Samuel L. Fitts, Ashburnham, Mass., assignor to George C. Winchester, same place.
106,478.—CULTIVATOR.—Julius Gerber, Rockford, Ill.
106,479.—COMPOSITION TO BE USED IN DYEING.—Franz. Graupner, Evansville, Ind.
106,480.—RAILWAY SWITCH.—James T. Guthrie and Louis Pausch, Leesburg, Ohio.
106,481.—RUFFLING ATTACHMENT FOR SEWING MACHINES.—Henry M. Hall, New York, N. Y.
106,482.—STALK AND KINDLING-WOOD CUTTER.—George B. Hamlin, Willimantic, Conn.
106,483.—HORSE-POWER.—George B. Hamlin, Willimantic, Conn.
106,484, antedated August 4, 1870.—FRUIT-DRIER.—Henry Henley, Shoals, Ind.
106,485.—HOISTING-JACK.—Frank Hollenberry, Frizellburg, Md., assignor to himself and John C. Frizell, same place.
106,486.—JOURNAL-BOX.—John Hughes, Newberne, N. C.
106,487.—COUPLING FOR WIRE RIGGING.—William Carlton Ireland, Boston, Mass.
106,488.—SHOE.—Joseph L. Joyce, New Haven, Conn.
106,489.—HEMMING AND FELLING DEVICE FOR SEWING MACHINES. Jacob Karr, Washington, D. C.
106,490.—BRICK-MACHINE.—John Keller, Paduca, Ky.
106,491, antedated August 5, 1870.—CENTRIFUGAL SUGAR-DRAINING MACHINE.—Hugh W. Lafferty and Robert Lafferty, Gloucester, New Jersey.
106,492.—WASHING-MACHINE.—John L. La Rose, Leavenworth, Kansas.
106,493.—ELECTRO-MAGNETIC MOTOR.—Landy Tunstall Lindsey, Jackson, Tenn.
106,494.—COMBINATION OF LABEL-HOLDER AND HANDLE.—Henry Maeneck, New York, N. Y.
106,495.—SPRING FOR PISTON PACKING.—David Maydole, Norwich, N. Y.
106,496.—HANDLE FOR CASKET.—Alexander McGuire, Winchester, Conn.
106,497.—STEAM-ENGINE.—Hermann Mohr, New York, N. Y.
106,498.—FLEXIBLE SHAFT.—James B. Morrison, St. Louis, Mo.
106,499.—KNITTING-MACHINE.—Edward Morse, Winchenden, Mass., assignor to Hinkley Knitting-machine Company
106,500.—SEEDER AND FERTILIZER COMBINED.—Washington B. Myers, Hampton, Va.
106,501.—NAIL.—Andrew Patterson, Worcester, Mass., assignor to John Dean, same place.
106,502.—FIRE-GRATE.—Merritt Peckham, Utica, N. Y.
106,503.—BASE-BURNING STOVE.—Merritt Peckham, Utica, N. Y.
106,504.—TOBACCO-BOX OR DRUM.—John Potter, Quincy, Ill.
106,505.—HORSE-POWER.—Tapley B. Pyron, Springfield, Mo.
106,506.—DRIPPING-PAN.—Adam Reid, Buffalo, N. Y.
106,507.—SHEAVE-BLOCK.—Thomas H. Rice, Baltimore, Md.
106,508, antedated August 10, 1870.—MANUFACTURE OF TRUSS-PADS.—S. S. Kitter, Philadelphia, Pa.
106,509.—IRONING-TABLE.—James H. Ruff, Thomas Run Post-Office, Md.
106,510.—GRINDSTONE JOURNAL-BOX.—Joseph B. Sargent, New Haven, Conn.
106,511.—MORTISING-MACHINE.—George Thomas Savary, Newburyport, Mass.
106,512.—PROPELLING APPARATUS.—Cornelius Schilling, New York, N. Y.
106,513.—HARVESTER-RAKE.—Jacobs W. Shuckers, Philadelphia, Pa
106,514.—TOWING HOOK FOR CANAL BOATS.—Leonard R. Shipman, Bloomsburg, Pa.
106,515.—SPARK-ARRESTER.—James Smith, Altoona, Pa.
106,516.—WASH-BOILER.—Oscar F. Stedman, Westfield, N. Y.
106,517.—FIRE-EXTINGUISHER.—Thomas Tripp, Chicago, Ill.
106,518.—COMPOUND FOR EXTINGUISHING FIRE.—William P. Van Duersen, Cincinnati, Ohio.
106,519.—COMBINED LATCH AND LOCK FOR GATES.—Henry R. Van Eps, Peoria, Ill.
106,520.—VEGETABLE CUTTER.—Franz Wagner, New York, N. Y.
106,521.—STOVE-GRATE.—R. Ward, Edinburg, Ind.
106,522.—VAPOR-BURNER.—Thomas Ward, Columbus, Ohio.
106,523.—MOTIVE POWER.—Wm. Medd Watson, Tonica, Ill.
106,524.—SAD-IRON.—William Webster, Washington, D. C.
106,525.—STEAM WATER ELEVATOR.—Henry Morse Wightman, Boston, Mass.
106,526.—THREAD-CUTTER FOR SEWING MACHINES.—Cornell J. Wood, Brewerton, N. Y.
106,527.—WATER-PIPE SUPPORT.—Chauncey D. Woodruff, Toledo, Ohio.
166,528.—VENTILATOR FOR STOAE-PIPES.—Chauncey D. Woodruff, Toledo, Ohio.
106,529.—VELOCIPEDE.—Charles Wyndham, Southover Grange, near Lewes, England.
106,530.—APPARATUS FOR RECTIFYING ALCOHOLIC LIQUORS.—Charles Louis Fleishmann, Cincinnati, Ohio.

REISSUES.

4,098.—STOVE-PIPE THIMBLE.—Thomas K. Anderson, Hornellsville, N. Y.—Patent No. 41,592, dated February 16, 1864.
4,099.—MACHINE FOR HUSKING CORN.—L. Augustus Aspinwall, Albany, N. Y.—Patent No 101,809, dated April 12, 1870.
4,100.—CAPSTAN AND WINDLASSES.—David N. B. Coffin, Jr., Newton, and Benjamin Woodward, Somerville, Mass., assignees, by mesne assignments, of David N. B. Coffin, Jr.—Patent No. 59,969, dated November 27, 1866.
4,101.—SAW-MILL.—Alexander McCreight, Tranquility, Ohio.—Patent No. 82,970, dated October 13, 1868.
4,102.—CHILLS FOR CASTING CAR-WHEELS.—William Wilmington, Toledo, Ohio.—Patent No. 85,016, dated December 15, 1868.

DESIGNS.

4,293.—JOURNAL-BOX.—Pascal P. Child, St. Louis, Mo.
4,294.—CARPET PATTERN.—John Dornan, Philadelphia, Pa.
4,295.—SHADE FOR GAS OR LAMP-BURNER.—John Letchworth, Philadelphia, Pa., assignor to Hartell & Letchworth, same place.
4,296.—HAND-STAMP.—Jules F. Pages, San Francisco, Cal.
4,297.—TABLE-CASTER.—Daniel Sherwood and George D. Dudley, Lowell, Mass.

Mining, as a Science and as an Investment.

IT may be safely asserted that at no period of the history of mining has the art drawn to itself such extensive consideration as at the present moment—from the man of science, as a subject calculated to afford ample scope for inquiry into the theory of metallic deposits and other natural phenomena; or from the man of business, as an opening for investment, and far exceeding all others in the lucrative return on the capital employed.

That mining always has been, and ever will be, a highly remunerative industry to those who engage in it circumspectly, and with due caution, may be inferred from the fact that from the earliest ages it has been unremittingly practised, and, it may be said, with a good degree of success. Evidences are easily obtained that even before the invasion and occupation of our island by the Romans mining was extensively prosecuted, and the metallurgic arts not indifferently understood by the early Briton. It would, doubtless, be a most difficult task to assign to their true causes the motives which led the primitive and barbarous inhabitants of Cornwall to seek for the metallic treasures lying hid in the numberless veins which traverse their native hills and valleys, in the face of difficulties which to them must have appeared well nigh overwhelming, but it may reasonably be presumed that profit of some sort or description was the power that urged them to their exertions, more especially if we judge them by our knowledge of the savage tribes still remaining on the earth, whose appreciation of the merits of a profitable transaction is as keen as, and in no way inferior to, that of their civilized brethren.

These causes must naturally give an explanation of the extraordinary revival of mining on all sides, and how the untiring labors of eminent geologists in teaching how to select the most favorable localities, and the skill of engineers in the preparation of most elaborate works and machinery, have wrought this great and welcome change—a change which bids fair to place mining in its true position as a medium for profitable and safe investment.

The great interest now taken in the mineral resources of this and other countries, induced by science in the selection of districts and by skillful appliances in surmounting difficulties which at one time appeared insurmountable, induces us to refer to the rapid progress which mining is making, and we cannot be venturing too far in saying that mining is one of the finest fields for speculation that can be found, although often looked upon by capitalists with prejudice and distrust; but if every transaction were fairly elucidated, and openness and candor practised, mining would become far more popular than it has been, and the adventurers would be far more benefitted. But here it is necessary for us to remark that if capitalists will only take the precaution of making full enquiries as to the persons who are to have the management of the mine, as well as those who are to be some of the shareholders, they will be better able to judge of the manner in which the management of the affairs of mining companies are likely to be conducted.

A good number of very promising undertakings have recently been established, and we hope and think they, or at least some of them, are based on a solid foundation, and if so they will be some of the greatest contributions to the wealth of the nation, and will secure for themselves a high position in the estimation of the public; and it requires the united energy and assistance of mining men to bring back the days of yore, when mining was looked upon with more favor. The almost uniform success that attends the development of well-selected and properly-managed mines is naturally enough daily attracting more attention on the part of capitalists, and by those acquainted with legitimate mines it will be allowed that, when properly conducted, mining is neither so uncertain or speculative as many have been led, either through ignorance or prejudice, to imagine; on the contrary, it frequently offers the most profitable advantages to the capitalist, great or small.—*London Mining Journal.*

BUSINESS AND PERSONAL.

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and now offer our services in procuring patents in this and foreign countries, and transacting all business relating to the obtaining of patents.

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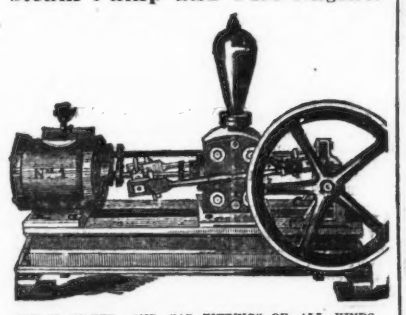

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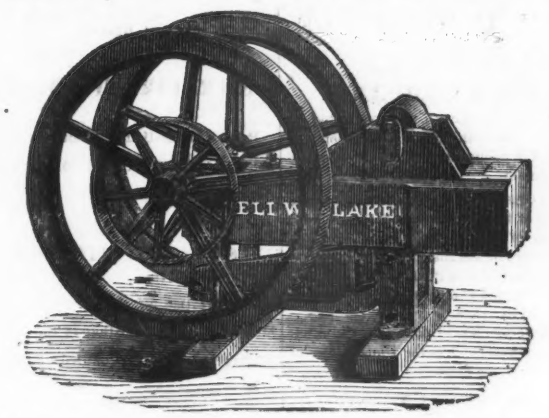

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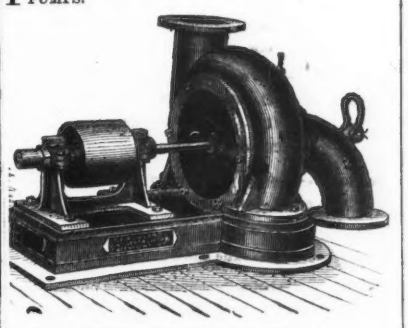

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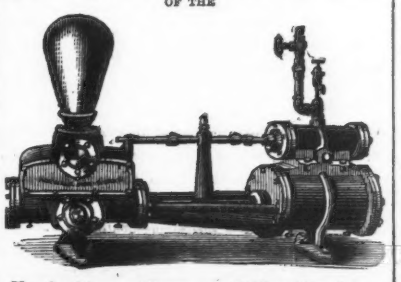

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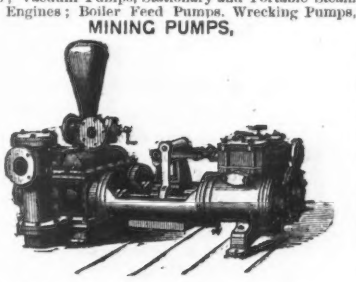

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Air, why it is propelled down, into and around the workings
" Quantity of, produced by the furnace.
" Friction of
" The great friction of produced by one mode of ventilation, and how reduced by another
" Pure added to impure (plans.
" Splitting of (plans)
" One current of (plans)
" One current of, and how to adopt separate currents (plan)
" Dividing of, but not into "separate and and distinct" current (plans)
" Crossings (see H on plans)
" Weight of in shafts
" How to find the weight of
" Table of pressure in shafts
" Expansion of
" Its velocity and force
" Rush of, into each division
" Quantity produced by natura ventilation
" Splitting, why it should be adopted
" Splitting, why the workmen object to Mr. Hopton adopting the mode
Anemometer, measurement of air by, engraving of
Area of a pit, how to find
Barometers, Showing the time of an outlet of gas in mines (engraving)
Bricks, how to find the number in the walling of a shaft.
Buddle's plan
Circumference of a pit, how to find
Coal, several ways of working it out, and why man methods of working it out are adopted
" Working out in banks (plans)
" Working it out in following up banks (plan)
" Working out in pillars (plans)
" Working out in long wall (plans)
" Working out in drifts (plans)
" Working out with no regularity (plan)
" Working out by the "end way" or in endings (plan)
Cubical Contents of a pit, how to find
Dialing, the mode of
Dials, several engravings
" How constructed
" How fixed in mine surveying
" Needle, its variations
Diameter of shaft
Dip of mine, how to find and lay on (plan)
Explosion, the power of an
" At Lund-hill, in what part of the mine it was supposed to take place (plan)
" How the power may be diminished
Furnace, how to find the horse-power of
" The place of fixing, to produce the largest ventilating current
" Engravings of ground floor, front and back view
" Remarks upon
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" Do. properties of
" (After, or choke damp) composition of
" (Carburetted hydrogen) do.
" Choke damp and carbonic acid, not one and the same in quality
" The effect produced on people by inhaling such
" The quantity required for an explosive mixture
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" The weight of
" The nature and quality of
" Why some mines generate and produce more than others
" Why some mines generate a mixture of
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Lund-hill (plan)
Managers, who are best competent to manage mines
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Regulations (see R on plans)
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Surveying, how mines are with the theodolite
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Theodolites, how constructed
Theodolites, the magnetic needle dispensed with, and how workings are laid on plan, with Theodolite surveying
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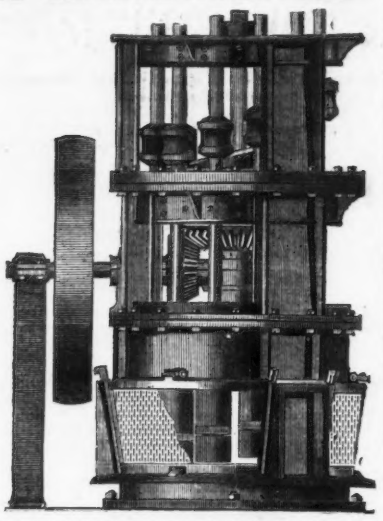

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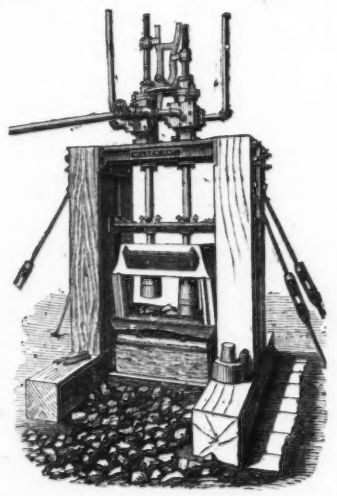

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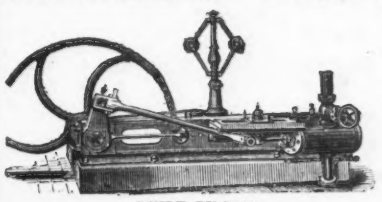

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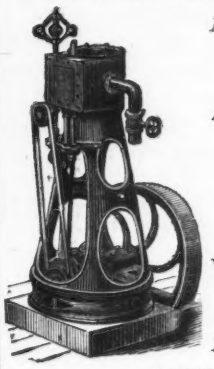

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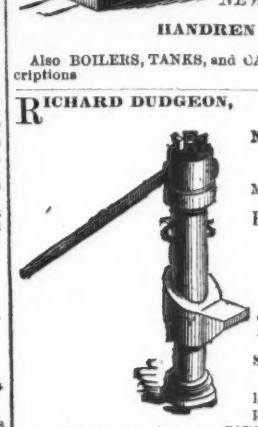

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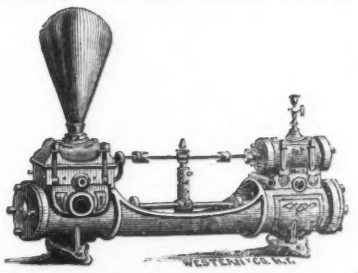

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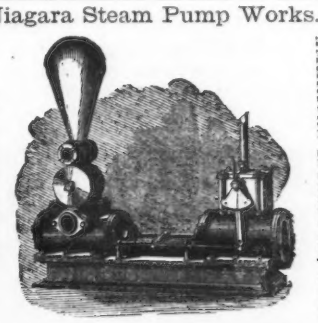

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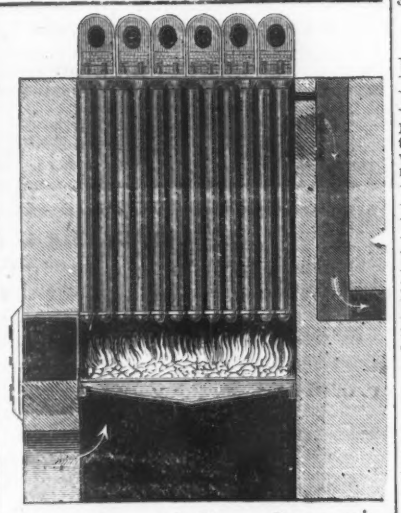

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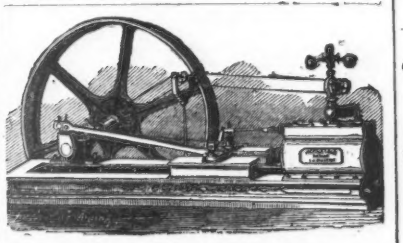

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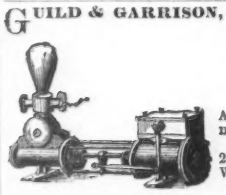

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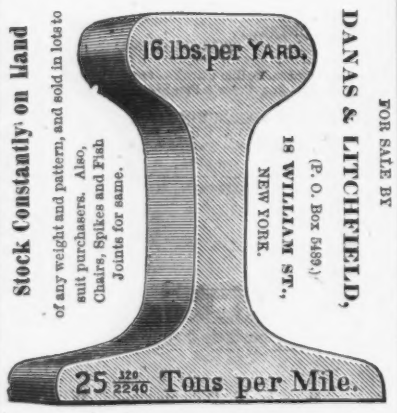
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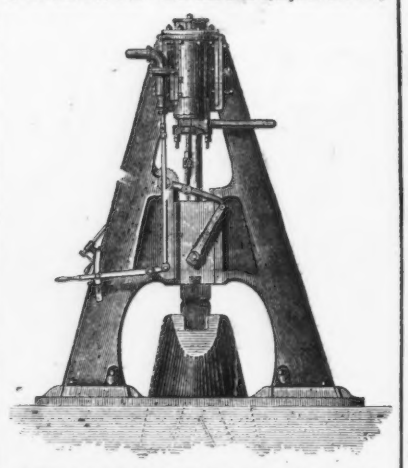

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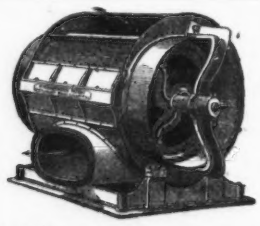

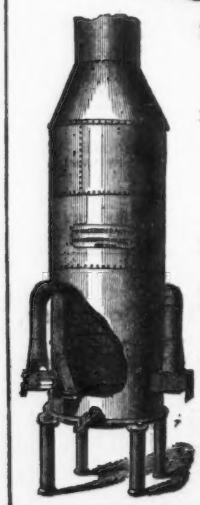

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